GEOGRAPHY

7

Based on Single National Curriculum 2022

Punjab Curriculum and Textbook Board, Lahore

بِسۡمِ اللّٰہِ الرَّحۡمٰنِ الرَّحِیۡمِ

(In the Name of Allah, the Most Compassionate, the Most Merciful.)

GEOGRAPHY 7

Web Version of PCTB Textbook
Not for Sale

Based on Single National Curriculum 2022

ONE NATION, ONE CURRICULUM

PUNJAB CURRICULUM AND TEXTBOOK BOARD, LAHORE

This textbook is based on Single National Curriculum 2022 and has been approved by the Board.

All rights are reserved with the Punjab Curriculum and Textbook Board, Lahore.

No part of this textbook can be copied, translated, reproduced or used for preparation of test papers, guidebooks, keynotes and helping books.

Contents

Unit	Topic	Page
1	Plains and Rivers	1
2	Water Sources and Management	15
3	Settlements and Land Use	28
4	Agriculture	43
5	Climate Change	59
6	Minerals and Powers	72
	Glossary	88
	Bibliography	90

Web Version of PCTB Textbook
Not for Sale

Authors

- **Muhammad Ramzan Khan** (PhD. Scholar)

Reviewers

Dr. Muhammad Ghous
Assistant Professor (Geography)

Ali Imam Mirza
Lecturer (Geography)

Dr. Muhammad Muneeb
Language Expert (English)

Muhammad Irfan
Assistant Professor (Geography)

Ms. Nimra
Lecturer (Geography)

M. Zubair Shahid Khan
Assessment Expert (PEC)

Dy.Director(Art&Design)

Anjum Wasif

Director Manuscripts

Ms. Farida Sadiq

Design&layout

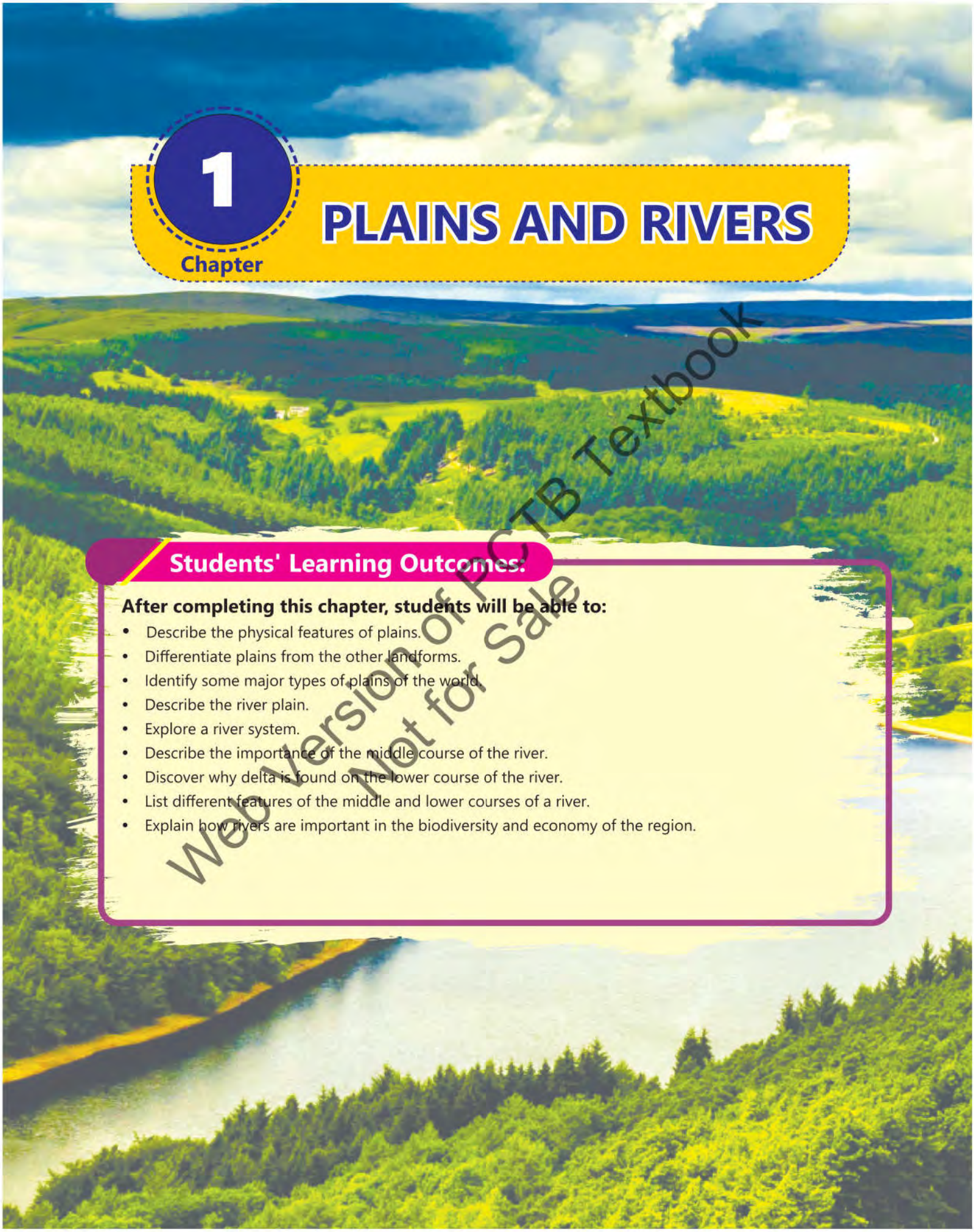
Sameira Ismail

Supervision

Shams Ur Rehman
SS (Geography)

Experimental Edition

Prepared by: Jadeed Educational Services, Lahore.



Chapter 1

PLAINS AND RIVERS

Web Version of PCTB Textbook
Not for Sale

Students' Learning Outcomes:

After completing this chapter, students will be able to:

- Describe the physical features of plains.
- Differentiate plains from the other landforms.
- Identify some major types of plains of the world.
- Describe the river plain.
- Explore a river system.
- Describe the importance of the middle course of the river.
- Discover why delta is found on the lower course of the river.
- List different features of the middle and lower courses of a river.
- Explain how rivers are important in the biodiversity and economy of the region.

Plains

A plain is a broad area of relatively flat land. Plains are one of the major landforms, or types of land on the Earth. They cover more than one-third of the world's land area. Plains exist in every continent.

Indus Plain

Tundra

Many plains, such as Indus Plain in Pakistan (including upper Indus Plain and lower Indus Plain) and the Great Plains that stretch across much of Central north America are grasslands. Grassland is a region where grass is the main type of vegetation.

Steppes

In Asia and Eastern Europe, temperate grasslands are called steppes. Steppes usually do not receive enough rain for tall grasses and trees to grow. Deserts may also be plains. Some parts of the Sahara, a great desert in north Africa are plains. In the Arctic, where the ground is frozen, plains are called Tundra.

Do You Know?

Tundra comes from the Finnish word "tunturi", meaning treeless plain.

Skills

- Investigate reasons why Arctic Plain is known as barren plain?
- Investigate the living conditions in a desert or the Arctic Tundra Plain.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Physical Features of Plains

Some features of plains are given below:

- Plains are vast stretches of flat land.
- Some plains are extremely levelled. Others may be slightly rolling and undulating.
- Plains are usually fertile regions.
- They are usually thickly populated regions.
- It is easy to build houses, roads, etc. in plains.
- They are suitable for cultivation.

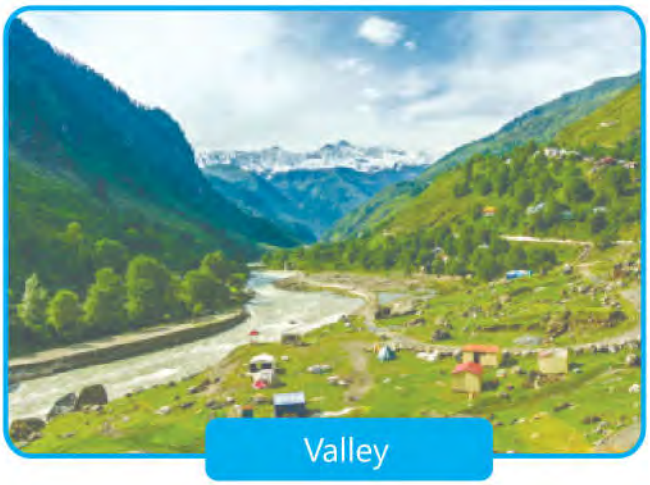
Difference Between Plains, Plateaus, Mountains and Valley

i. The main difference between plain and plateau lies in their elevation. A plateau is a flat land that is raised significantly above the ground whereas plain is a flat yet low-lying area.

Plateaus

Plains

Mountain



Valley

ii. Mountains have steep slopes with a pointy summit. They are the highest natural landscapes.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

iii. A valley is a deep depression between mountain peaks, hills or plateaus that forms over millions of years usually due to fast flowing water.

Do You Know?
Indus Plain is a depositional plain.

Some Major Types of Plains

Broadly there are various types of plains on the basis of formation such as;

1- Erosional Plains:

These plains are formed in millions of years due to action of various agents like river, glacier and wind. They Formed, when the higher landforms are eroded into level Plain areas, e.g. Lorraine Plain in France.

2- Depositional Plains:

This type of plain is formed by deposition of sediments brought down by rivers, glaciers, and winds. This type of landform has a significant impact on the soil fertility and economic development of the area. A coastal plain is a piece of land that is lying low and adjacent to the sea coast.

Skills

- Search images and photographs of plains and paste them in your notebooks.

3 - River Plain

This plain is formed by the river. It is formed over a long period of time when a river deposits its sediments on their flood plains or beds. For example, the Indus River Plain is a vast expanse of fertile land with a gentle slope from the Himalayan piedmont in the north to the Arabian Sea in the south. River plains are grouped into the followings:

I- Alluvial Plains

When the river enters into the plain stage, the slope and speed of that river reduces which cause deposition of the alluvium brought by the river forming Alluvial Plain. **For examples**, Indo-Gangetic Plain across India, Bangladesh and Pakistan, Po Valley in Italy, etc

Alluvial Plains

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

ii- Flood Plain

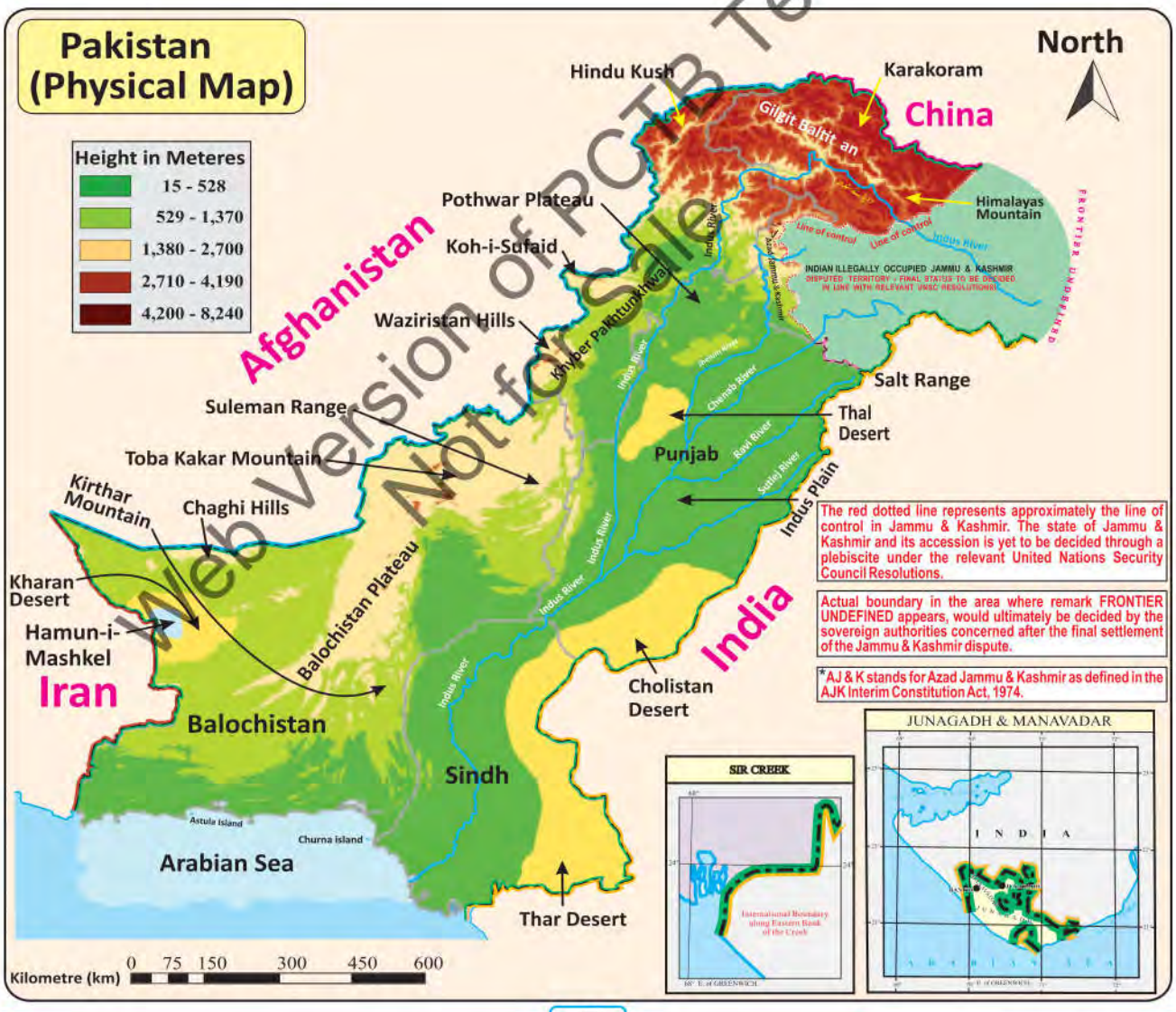
A flood plain refers to an area of flat land along river sides. Flood plains are usually subjected to flood when the adjacent water body overflows. These plains are often fertile and good for agriculture. For example, the Indus Plain.

Flood Plains

4-Glacial Plains

Do You Know?

River Nile is said to be "Gift for Egypt", because it provides fertile soil which supports agriculture.



Web Version of PCTB Textbook Not for Sale

NOT FOR SALE (PESRP)

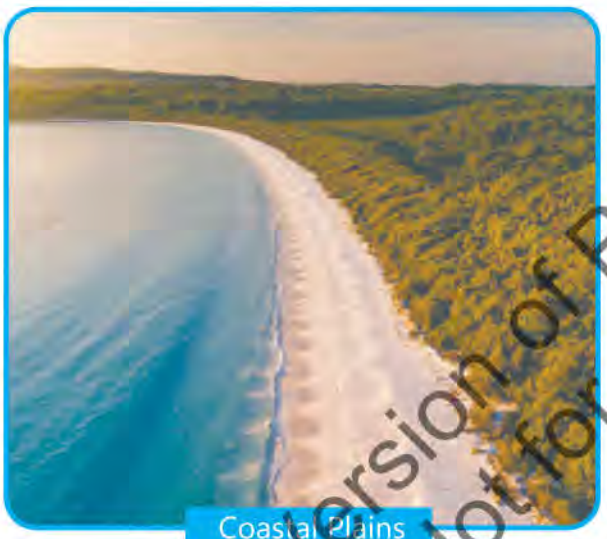
Glacial plains are formed by the material accumulated by a glacier. For example, An Outwash Plain, is a plain formed by glaciofluvial deposits due to meltwater.

5-Lacustrine Plain

A Lacustrine Plain or Lake Plain is formed due to the past existence of a lake. The Kashmir Valley is an example of a Lacustrine Plain.

6-Coastal Plains

In geography, a Coastal Plain is an area of flat, low-lying land adjacent to a sea coast. Such plains are blessed with rich biodiversity. The southeastern coastal plain of north America is notable for its species diversity. Two provinces of Pakistan i.e Blochistan and Sindh are blessed with coastline. The coastline covers almost 1,058 km lenght that is connected with Arabian Sea.



Coastal Plains

Wind Plains

Web Version of PCTB Textbook
Not for Sale

7-Wind Plains

The wind is the main geomorphic agent in the hot deserts. Winds in hot deserts have greater speed which causes erosional and depositional activities in the desert. Wind plain is a broad, flat area of desert covered with wind-swept sand with little or no vegetative cover. When the high relief structures in deserts are reduced to low featureless plains by the activities of wind, they are called as **Pediplains.**

Some Features Formed by River

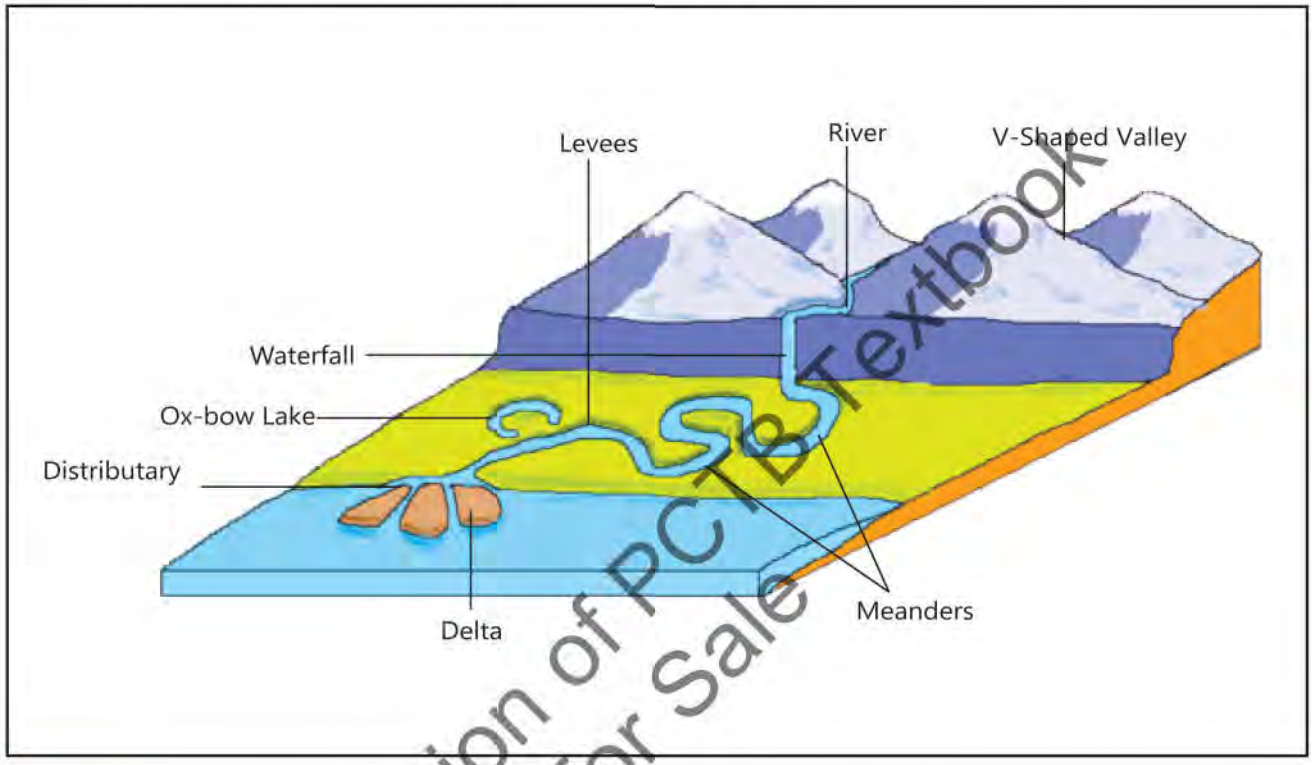
Flood Plains

Flood Plains are formed when river's water comes out of its channel and spreads over vast stretches of land .During this process it deposits its sedements in the areas. In this way a smooth Plain comes into existence, which is called flood Plain.

NOT FOR SALE (PESRP)

Ox-bow Lakes

When a river enters into a plain areas, it twists and turns forming large bends or meanders. Due to continuous erosion and deposition along the sides of the meander, the ends loop close, and after a while, cut off from the river and form Ox-bow Lakes.



Web Version of PCTB Textbook
Not for Sale

Meanders

A mature course is developed when water moves down the slope slowly under the force of gravity. The water does not move in a same direction for long distances. The irregularities of the ground, force the river to flow/swing in loops, forming meanders.

Natural Levees

Levees are formed by the repeated flooding of the river. When the river flooded, the most coarse material deposits, close to the river banks. This may continue to build up the levees over time.

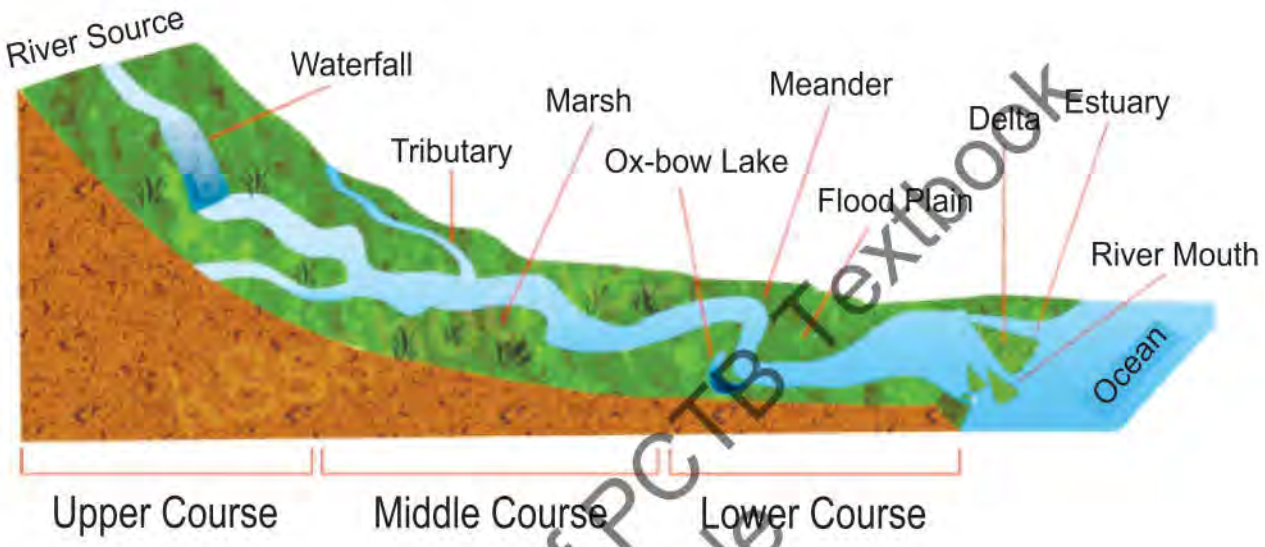
Distributaries

When a river approaches the sea, its speed decreases and it breaks down into a number of streams known as distributaries. The shape of these distributries are like a symbol of delta ('), so it is called river delta.

NOT FOR SALE (PESRP)

River System

A river is made up of different small tributaries. Tributary is a fresh water channel feeds into a large river. This channel of tributaries and the main river is called river system. The area that a river system covers is called basin.



Web Version of PCTB Textbook
Not for Sale

Importance of the Upper Course of the River

The main function of a river in its upper course is erosion. It erodes its bed and banks and carries large boulders of rocks with it. The landforms formed in the upper course of a river are V-shaped valley and waterfall.

Importance of the Middle Course of the River

The middle course of a river has more potential and volume than in the upper course. The gradient is gentler and lateral (sideways) erosion has widened the channel. This happens in upper stage where river does inward erosion. Meanders are typical landforms found in this stage of the river.

Importance of the Lower Course of the River

The volume of water in a river is highest in the lower course. This is due to the contribution of water from tributaries. The river channel is deep and wide and the land around the river is flat. Energy in the river is at its lowest due to load of sediments and deposition occur.

Skills

- Inquire about the working of a river system.

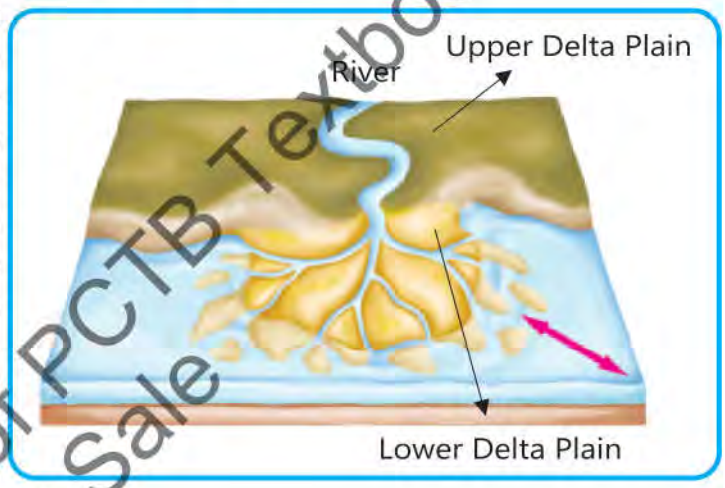
NOT FOR SALE (PESRP)

Note For Teacher:

- Divide the class into three groups to collect the information about each course of the river.
- Present their findings to the rest of the groups. The teacher can guide other groups to take notes while one group is presenting.

Why Delta is Found on the Lower Course of the River

A delta is a marshland area that forms as river water falls into a larger body of water. Often, delta is looked like triangular in shape and sometimes it is even described as looking like a fan. River collects soil particles and rock debris called sediment. These sediments flow along the river until it is deposited at the river's mouth. These sediments collected, low-lying plains are created, and a delta is formed. Nile River falls into the Mediterranean Sea. Indus River falls into Arabian Sea and formed delta respectively.



Different Features of the Upper, Middle and Lower Courses of a River

River flows from higher elevation to a lower elevation, due to gravity. A river forms many features during its journey towards the sea / ocean. Some features of the upper, middle and lower courses of a river are listed below:

Features of the Upper Course of a River	Features of the Middle Course of a River	Features of the Lower Course of a River
• Steep-sided • V-shaped valleys • Rapids • Waterfalls • Gorges	• U-shaped valleys • Meanders • Ox-bow lakes • Flood Plains • Levees	• Wide flat -bottomed valleys • Estuary • Deltas

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Importance of Rivers in the Biodiversity and Economy of the Region

Importance of Rivers in the Biodiversity

Rivers are important habitats for a large variety of animals and plants. Fish, amphibians, birds, insects, invertebrates, and reptiles live in rivers, or find their food there. Rivers play a vital role in connecting habitats. Importance of rivers is as under :

Web Version of PCTB Textbook
Not for Sale

River Biodiversity

- Rivers provide excellent habitat and food for many land organisms.
- Many rare plants and trees grow by rivers.
- Ducks, voles, otters and beavers make their homes on the river banks.
- Many animals depend on river for food and water.
- Birds such as kingfishers eat small fish from the river.
- Insects, mammals and birds use the delta for their homes and for food.

NOT FOR SALE (PESRP)

Importance of Rivers in Economy

Rivers are important for the economy of any country. The water from the rivers is a basic natural resource that is essential for various human activities, like:

Rivers in Economy

1. Rivers help to generate hydro-electricity.
2. They enhance fertility to the soil.
3. Rivers provide water for irrigation.
4. Rivers are best sites of tourism.
5. They provide water for various domestic uses.
6. They provide livelihood to fishermen.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

What We Have Learnt!

1. A plain is a broad area of relatively flat land. They cover more than one-third of the world's land area.
2. Mountains are the highest natural landscapes.
3. Erosional plains are formed by the action of various agents like river, glacier and wind, etc.
4. River plain is formed by river. It is formed over a long period of time by a river's sediments .
5. The main function of a river in it is upper course is erosion
6. Levees features are formed by the repeated flooding of the river.
7. A river along with its tributaries is called a river system.
8. The economic importance of rivers includes fish stocks, river transport, storage of goods, recreation and groundwater recharge.

Web Version of PCTB Textbook
Not for Sale

EXERCISE

Q.1: Tick (✓) the correct answer.

i. In Asia and Eastern Europe, temperate grasslands are called:
   (a) tundra (b) steppes
   (c) deserts (d) tropical

ii. Plains are vast stretches of:
   (a) flat land (b) frozen land
   (c) rocky land (d) sandy land

iii. The highest natural landscapes are:
   (a) plains (b) plateaus
   (c) mountains (d) valleys

iv. The Kashmir Valley is an example of:
   (a) Alluvial Plain (b) Flood Plain
   (c) Lacustrine Plain (d) Wind Plain

NOT FOR SALE (PESRP)

v. Repeated flooding of the river form:

(a) Meanders (b) Levees

(c) Delta (d) Ox-bow Lake

Q. 2: Give short answers of the followings:

i. Define the term plain.

ii. What are Plateaus?

iii. Write the three features of Middle Course River.

iv. Define the term valley.

v. Write the formation of flood plain.

Q. 3: Write the answer of the following in detail:

i. What are the physical features of plains? Describe.

ii. Explain some major types of plains.

iii. Differentiate plains from the landforms like plateaus, mountains and valley, etc.

iv. Describe the features formed by river.

v. What is a river system? Explain.

vi. Compare the middle course of river with lower course of river.

vii. Explore the importance of rivers in the economy of a country.

Web Version of PCTB Textbook
Not for Sale

Learning Activities:

The Teacher will:

i. Arrange face to face or online discussion with at least one school in any other region (like people living near rivers or in plains / plateaus / desert) and share their notes on biodiversity, economy, and lifestyle.

ii. Give a presentation to explain different aspects of the unit like the upper course of a river to develop their understanding.

NOT FOR SALE (PESRP)

Critical Thinking

Critical thinking is the analysis of available facts, evidence, observations, and arguments to form a judgment.

Critical thinking happens when children draw on their existing knowledge and experience, as well as on their problem-solving skills, to do things like:

- Think of creative solutions.
- Predict what will happen in the future.
- Understand the perspectives of others.
- Evaluate ideas and form opinions.
- Explain why things happen.
- Compare and contrast.

Web Version of PCTB Textbook
Not for Sale

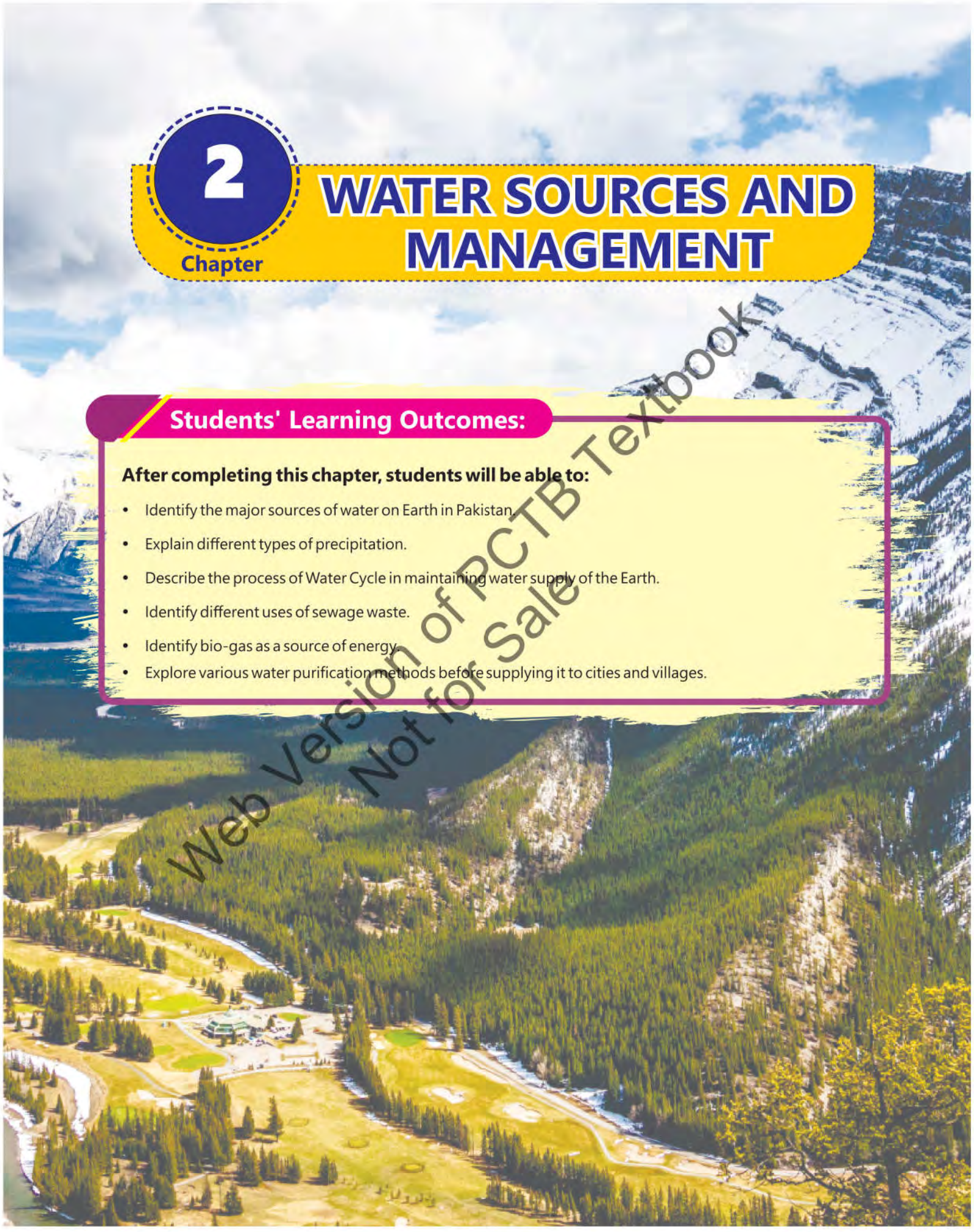
Critical Thinking Questions:

- The relief of Pakistan displays a great physical variation.Explain how?
- Why are river's plains thickly populated?
- Which two factors can change a river?
- How do dams affect the river and its environment?
- Why do deltas attract people?

Projects For Students:

- Make a model of a River System, label the different features of river and Share with your classmates.

NOT FOR SALE (PESRP)



Chapter 2

WATER SOURCES AND MANAGEMENT

Students' Learning Outcomes:

After completing this chapter, students will be able to:

- Identify the major sources of water on Earth in Pakistan.
- Explain different types of precipitation.
- Describe the process of Water Cycle in maintaining water supply of the Earth.
- Identify different uses of sewage waste.
- Identify bio-gas as a source of energy.
- Explore various water purification methods before supplying it to cities and villages.

Web Version of PCTB Textbook
Not for Sale

Water is one of the most important commodities and basic need of life on Earth. It is essential to human life. It is used in diverse areas such as farming, cooking, cleaning, construction and even for recreational purposes.

Major Sources of Water on Earth and in Pakistan

There are numerous sources of water ranging from underground sources to surface sources. Some of the main water sources on Earth and in Pakistan are discussed as under:

i- Oceans

Oceans are the largest sources of water on Earth. There are five oceans in the world. Ocean water is not suitable for human consumption in its raw form. It contains high salt levels and other impurities that make it unsuitable for household use. However, countries situated in dry regions such as Saudi Arabia, United Arab Emirates, Oman, and Australia use a technique known as desalination to purify ocean water. Desalination involves the striping of salts and other components found in ocean water. The process is less in use due to huge cost. Oceans are the busiest trade routes in the world. Eighty percent trade of the world is doing through oceans.

Water on Earth

ii- Rivers

Rivers are natural paths through which water flows towards another river or a larger water body. There are several rivers flowing in different directions in the most parts of the world. Rivers provide water for farming, hydro-power generation, marine life industry and transportation, etc.

iii- Lakes

Lakes are an important source of livelihood for many people around the world. Lakes are classified into two categories: salt-water lakes and fresh water lakes. Lake water is used by the communities that live around the natural resource. Many people who live near lakes practice fishing. Farming communities also use lake water to irrigate their farms and boost their agricultural output.

Do You Know?

The World's largest lake is found in north America.

iv- Glaciers and Icecaps

Glaciers and ice caps are natural sources of fresh water. Glaciers are formed when ice accumulate over several years. Most glaciers and ice caps are found in

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

higher altitude and areas close to the north and south pole. Even the large quantities of useful fresh water contained in glaciers and ice caps. These huge natural bodies melt slowly and water flow into nearby rivers where people use it.

Glaciers and Icecaps

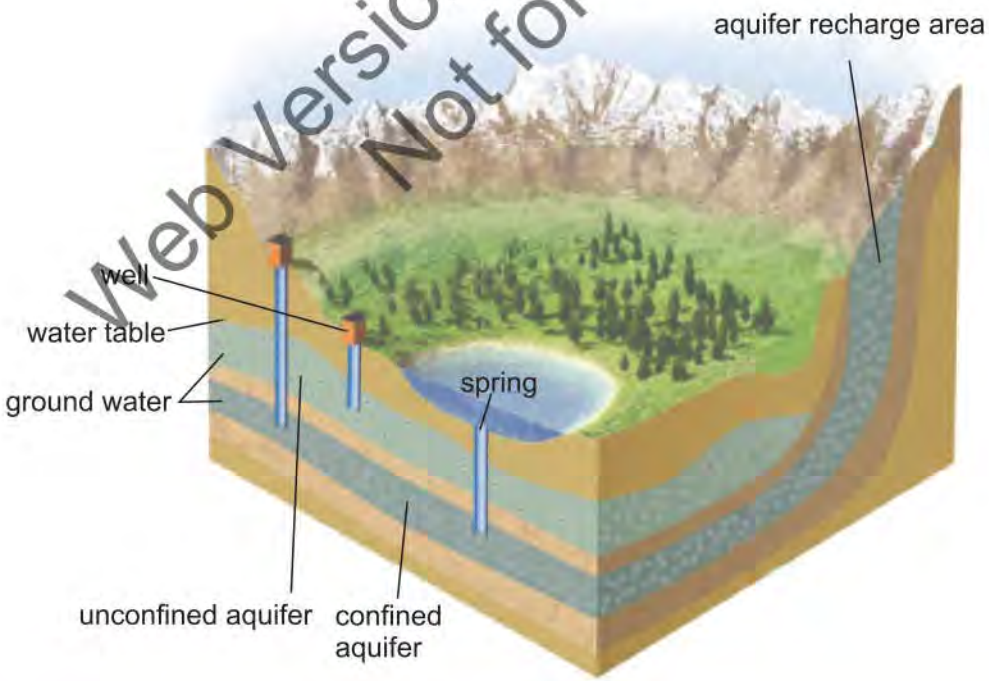
v - Ponds

Ponds are shallow water sources usually smaller than a lake. Ponds are part of the many surface water sources. Some ponds occur naturally while others are man-made. Ponds may contain aquatic plants and animals. Water found in ponds is often used for support agriculture, fishing industry, landscaping ventures, and in rehabilitation of damaged land.

vi- Springs

Springs are natural freshwater sources found on the Earth's surface. They get their water from underground streams or aquifers. Some springs may produce hot water, while others produce cold water. Spring water is often used in commercial production of drinking water. Additionally, hot springs are popular tourist attractions, medical therapy, and recreational centres.

Web Version of PCTB Textbook
Not for Sale



NOT FOR SALE (PESRP)

vii- Aquifers

Aquifers are water sources found below the surface of the Earth. They are underground porous rocks that contain water. It is estimated that 30% of the World's liquid water is found below ground. Water in underground aquifers may come to the surface through natural springs. In some cases, the water is pumped to the surface through specialized equipments. Aquifers are important water sources, especially in arid areas. Aquifers provide water for irrigation, industrial use and household needs.

viii- Rainwater

Rainwater is a common natural source of water. It is a seasonal source of water. The rainwater is collected in water tanks and dams in the rainy season for use in dry season. Most people in the developing world rely on rain water. Rain water is used for household needs, farming, replenishing ponds and hydro-power generation.

Skills

- Draw and label Water Cycle.
- Devise ways to solve the shortage of water in Pakistan.

Web Version of PCTB Textbook
Not for Sale

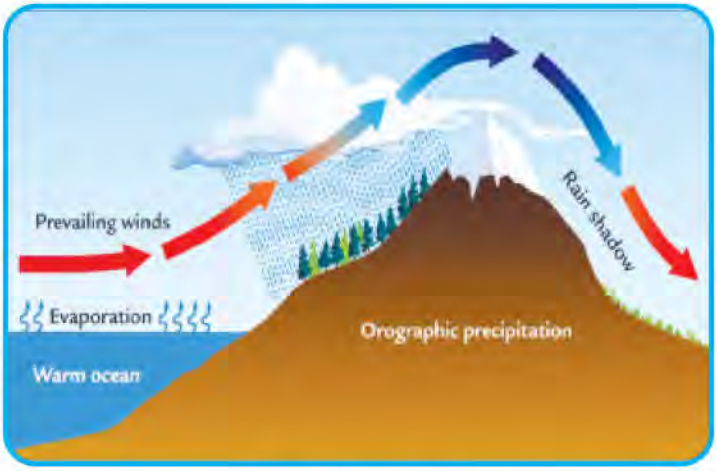
Different Types of Precipitation

The fall of moisture on the surface of the Earth in liquid or solid form is known as precipitation. Rain, snow and hailstorm are the forms of precipitation. Their detail is given below:

1. Rainfall

When moist air moves up from the Earth surface in the form of water vapours, condensation takes place and clouds are formed.

The vapours combine together and take the shape of water drops. When these drops become bigger, they fall down as rainfall. The following are the important types of rainfall:



Relief Rainfall

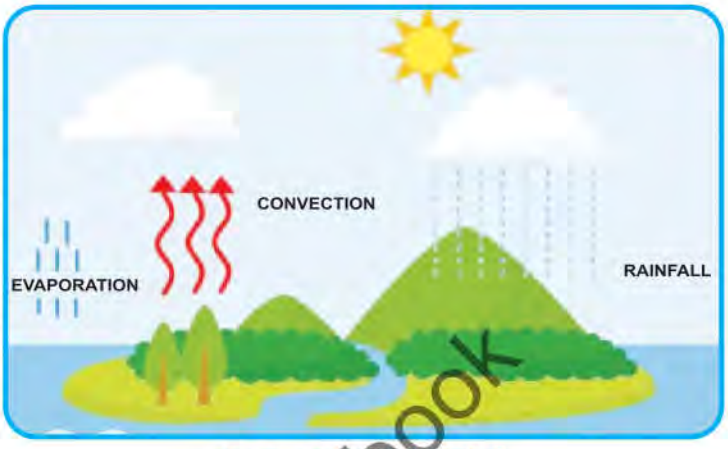
(i) Orographic / Relief Rainfall

When the mountains block the moist air, it moves upwards and temperature drops. Vapours turn into drops and rainfall occurs. This is known as orographic rainfall.

NOT FOR SALE (PESRP)

(ii) ConvectionlRainfall

The rain due to convectional currents is known as convectional rainfall. In hot areas, the air due to high temperature becomes light and moves upward on reaching at higher altitudes, condensation takes place which results in rainfall.



Convectional Rainfall

(iii) Cyclonic/Frontal Rainfall

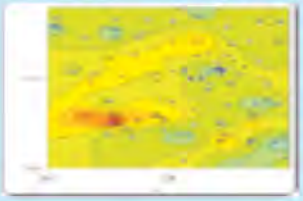
Cyclones are spiral moving winds, having low pressure in its center. They are formed in the area where cold winds meet hot winds. Hot air moves upward being lighter in weight. Its temperature decreases gradually and condensation starts. Heavy clouds are formed and rainfall occurs. This type of rain occurs in the front of cyclone and its rear portion.

Rain Gauge

The instrument used to measure rain is Rain Gauge.

Isohyet

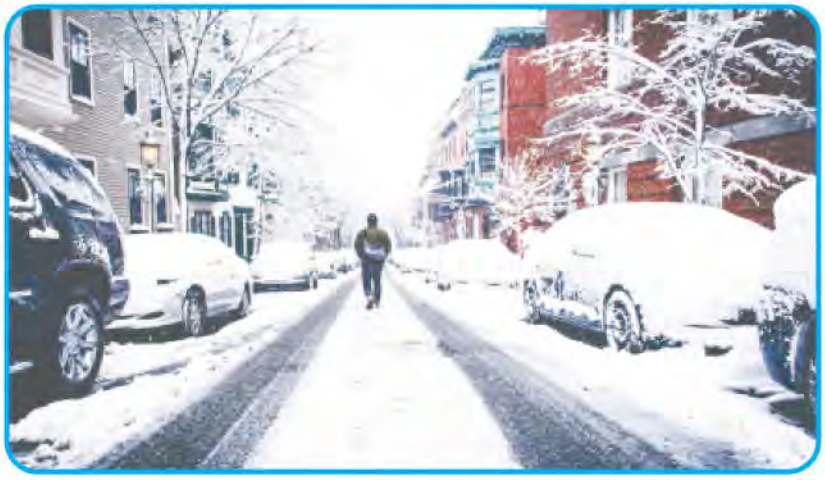
The lines on a map showing equal amount of rainfall are called isohyets.



Web Version of PCTB Textbook
Not for Sale

2. Snowfall

Sometimes, humid air reaches the point in atmosphere where the temperature is even below freezing point. The water vapours instead of turning into droplets, turn into snow or into frozen crystals of snow. These crystals combine and make snow flakes . These flakes fall on the surface and form snowfall.


Snowfall

NOT FOR SALE (PESRP)

Do You Know?

Precipitation is the source of fresh water storage in hilly, plain and desert areas.

3. Hailing

Air takes the water vapours to such cold areas in atmosphere where temperature is below freezing point. Here water vapours freeze and form hails which fall on the Earth. When these hails fall, the water vapours in their way join them and their size increases.

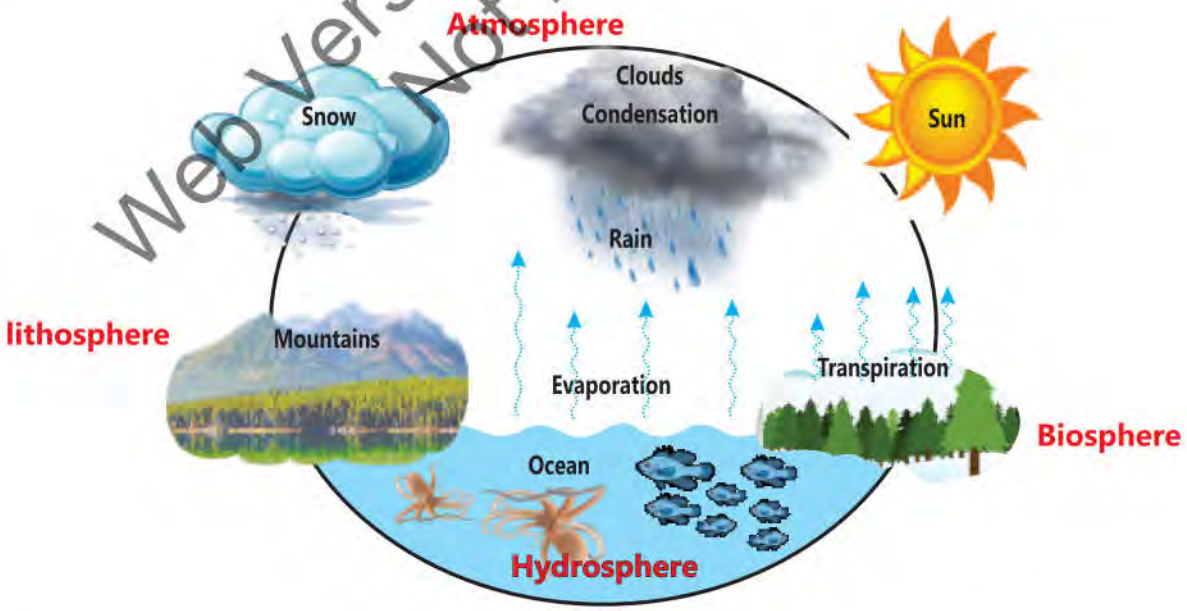
4. Sleet

The combination of rainfall and snowfall is called sleet. When raindrops pass through the lower cold layers of atmosphere they freeze. These drops contain liquid water inside but their outer covering is hard.

Sleet

Process of Water Cycle

Water is the basic element of nature. It covers about 71% of the Earth surface. It provides life, eases out heat, drains harmful



Water Cycle

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

substances and mediates many day-to-day activities. Water needs to be replenished, purified and circulated again and again so that it can perform its functions. Nature does this job through a process called the water cycle also known as hydrologic cycle. This is a phenomenon where water moves through the three phases (gas, liquid and solid) over the four spheres (atmosphere, lithosphere, hydrosphere and biosphere) and completes a full cycle.

The water cycle has many effects:

- It regulates the temperature of the surroundings.
- It changes weather and brings rain.
- It helps in conversion of rocks to soil.
- It circulates important minerals through the spheres.
- It also creates many geographical features present on earth like the ice caps of mountains, icebergs, rivers, valleys and lakes etc.

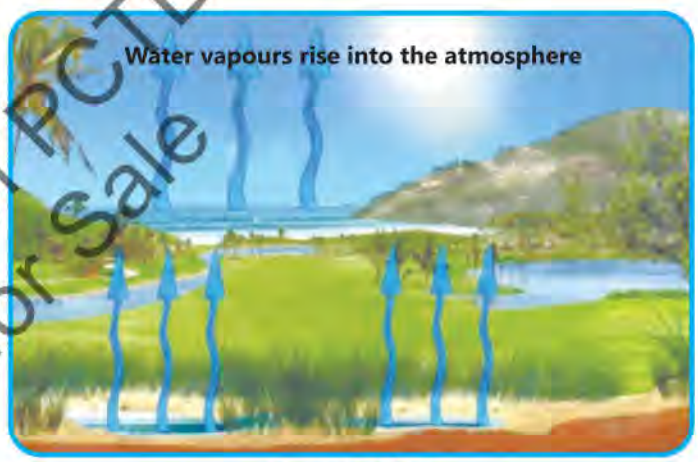
Do You Know?

Plants also contribute to the process of evaporation through transpiration.

Web Version of PCTB Textbook
Not for Sale

Step 1: Evaporation

The process of water cycle begins with evaporation. It is a process where water at the surface turns into water vapours. Water absorbs heat energy from the Sun and turns into vapours. Water bodies like oceans, seas, lakes and rivers, etc. are the main sources of evaporation.



Evaporation

Step 2: Condensation

When the vapours reach at higher altitude, their temperature decreases and the vapours turn into droplets. This conversion is called condensation.

Step 3: Sublimation

Sublimation is a process where ice directly converts into water vapours without converting into liquid water or vapours directly converts into ice without converting into liquid.

Let us Learn More!

- Global warming has impacted the Water Cycle causing wet places to become wetter and dry places drier.

NOT FOR SALE (PESRP)

Step 4: Precipitation

During condensation the water droplets join together and start falling on the earth surface, it is called precipitation. Rainfall is most common form of precipitation.

Step 5: Transpiration

Transpiration is a process similar to evaporation where liquid water is turned into water vapours by the plants.

Step 6: Runoff

Runoff is a process where water runs over the surface of the Earth. As water runs over the ground, it displaces the top soil with it and moves the minerals along with the stream.

Step 7: Infiltration

Some of the water that precipitates does not runoff into the rivers and is absorbed by the plants or gets evaporated. It moves deep into the soil. This is called infiltration. The water seeps down and increases the level of ground water table. It is called pure water and is drinkable.

Activity:

- Design a poster of various sources of water and display in the classroom.

Different Uses of Sewage Waste/Gray Water Uses

Sewage water or Municipal waste water means the water that has been used in urban and suburban area homes or businesses for washing, bathing and flushing toilets. Municipal wastewater may also include water from industrial sources.

The wastewater is conveyed via the sanitary sewerage system to a centralized wastewater treatment plant. The treated water is released to streams and rivers or may be sprayed over large areas of land.

Skill

- Evaluate ways of using wastewater.

Critical Thinking Questions:

- Explore different uses of sewage waste with the students.

Web Version of PCTB Textbook Not for Sale

NOT FOR SALE (PESRP)

Biogas as a Source of Energy

Biogas

- Biogas is a renewable fuel produced by the breakdown of organic matter such as food scraps and animal waste.
- It can be used in a variety of ways including as vehicle fuel and for heating and electricity generation.
- Biogas has gained popularity in recent years as a "greener" fuel.
- Biogas is an environment-friendly and renewable energy source. For this ,the waste material needs to be enclosed in an environment where there is no oxygen.
- After biogas is captured, it can produce heat and electricity for use in engines, microturbines and fuel cells.
- Biogas can also be upgraded into biomethane, and injected into natural gas pipelines or used as a vehicle fuel.

Various Water Purification Methods

It is extremely important to confirm the water has been purified or treated before drinking. If water is contaminated that there are various water purification methods that are used today Each method has its own merits and demerits. Filtering is good for basic water tasks such as sediment and chlorine removal, but in the long run reverse osmosis is the best option. There are four water purification methods that we can use to make our water safe for drinking.

1 Boiling

Boiling Water is the cheapest and safest method of water purification. Sometimes the water contains parasites and germs that we may not see with naked eyes, but they badly affect our health. So, clean water should be brought to boil and left at rolling-boil for 1-3 minutes.

Boiling of water

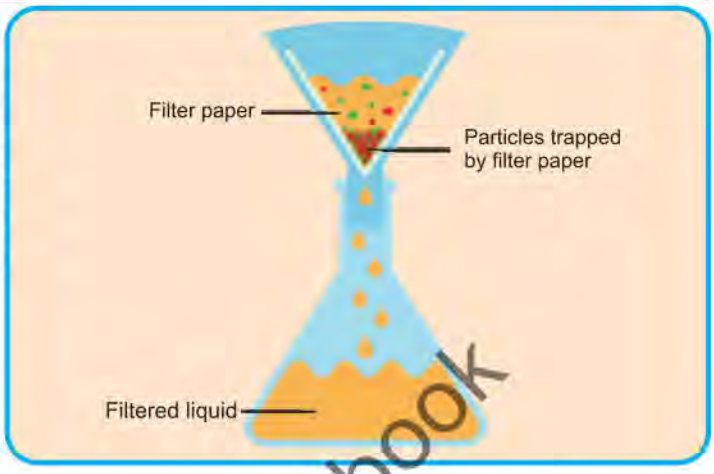
2 Filtration

Filtration is one of the effective ways of purifying water. This method uses chemical and physical processes to purify water and make it

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

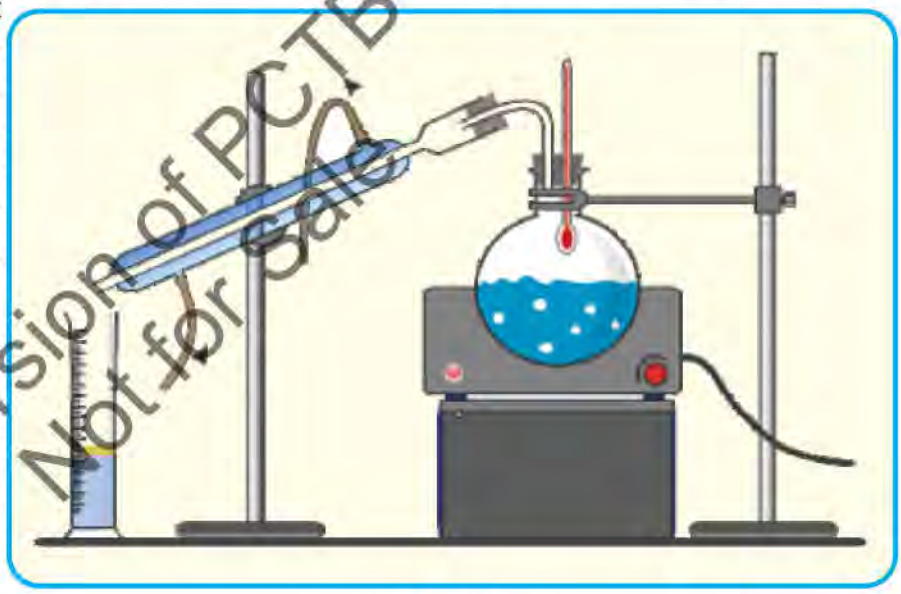
safe for human consumption. Filtration eliminates both large and small compounds, dangerous contaminants that cause diseases with a simple and quick filtration process. It is cost effective method of purification as it involves less energy and very little water is lost during this method.



Filtration

3 Distillation

Distillation is a water purification method that utilizes heat to collect pure water in the form of vapours. This method is effective as proven by the scientific fact that water has a lower boiling point than other contaminants and disease-causing elements and organisms found in water. Water is subjected to a heat source until it attains its boiling point. It is then left at the boiling point until it vaporizes. These vapours are directed into a condenser to cool. Upon cooling, vapours are turned into liquid water that is clean and safe for drinking. Other substances that have a higher boiling points are left as sediments in the container.


Distillation

This method is effective in removing bacteria, germs, salts and other heavy metals such as lead, mercury and arsenic.

Web Version of PCTB Textbook
Not for Sale

4. Chlorination

Chlorine is an effective water purification method that kills germs, parasites and other disease-causing organisms found in ground or tap water. Water can be purified using chlorine tablets or liquid chlorine. Chlorine is cheaper and effective. However, caution should be taken when using chlorine liquid or tablets to treat drinking water. For example, people suffering from thyroid problems should talk to a medical practitioner before using this product. Chlorine tablets kill all bacteria leaving water clean and safe.

NOT FOR SALE (PESRP)

Skills

- Organize information about water purification methods into flow charts.
- Analyze the reasons for the scarcity of drinking water in cities.

Note For Teacher:

- Divide the class into groups and assign one method of water purification to each group. Each group to make mini-projects/presentations and share their findings with other groups.

What We Have Learnt!

1. Water is one of the most important commodities on Earth and it is essential for life.
2. Oceans are the largest sources of water on the planet. There are five oceans in the entire world.
3. Lakes are an important source of livelihood for many people around the world.
4. Rivers are natural paths through which water flows towards another river or a larger water body.
5. Glaciers are formed when large pieces of ice accumulate over several years.
6. Aquifers are water sources found below the surface of the Earth.
7. The fall of water drops on the surface of Earth in liquid or solid form is known as precipitation.
8. Water is the basic element of nature. It covers about 71% of the Earth's surface.
9. Biogas is a renewable fuel produced by the breakdown of organic matter such as food scraps and animal waste.
10. While using chlorine tablets, it is important to apply them in heated water.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

EXERCISE

Q.1: Tick (✓) the correct answer.

i. The cheapest naturally occurring water source:
   (a) river (b) glacier
   (c) ocean (d) rainwater

ii. The Water Cycle begins with:
   (a) evaporation (b) condensation
   (a) transpiration (d) infiltration

iii. Water covers of the Earth's surface:
   (a) about 69% (b) about 71%
   (c) about 73% (d) about 75%

iv. Water purification methods are :
   (a) 2 (b) 3
   (c) 4 (d) 5

v. The river is estimated to carry 20% of all the fresh water found on the Earth:
   (a) Indus (b) Amazon
   (c) Nile (d) Tigris

Q. 2: Give the short answers of the following:

i. What is orographic rainfall?
ii. Write two uses of biogas.
iii. Define the term Chlorination.
iv. What are aquifers?
v. Which instrument is used to measure rain?

Q. 3: Write the answer of the following in detail:

I. Explain the major sources of water on Earth and Pakistan? Explain
ii. Describe the different types of precipitation.
iii. Explain the process of Water Cycle in maintaining water supply of the Earth.
iv. Describe different uses of sewage waste.
v. Discuss the biogas as a source of energy.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Learning Activities:

The Teacher will:

i. Show students photographs/ videos of areas affected by scarcity of water. Ask them to discuss its impacts on life in general (lifestyle, economy, weather, environment, flora, and fauna) in pairs/ groups.

ii. Show videos or arrange Student Study Tours to biogas plants and water treatment units.

iii. Use diagrams or presentations to explain different aspects of the unit like water sources, Water Cycle, and water treatment to develop their understanding.

Critical Thinking Questions:

- What will happen if there is no Water Cycle?
- Can biogas reduce climate change?
- How does sewage affect water quality and aquatic life
- Which regions received the highest rate of precipitation and why?

Projects For Students:

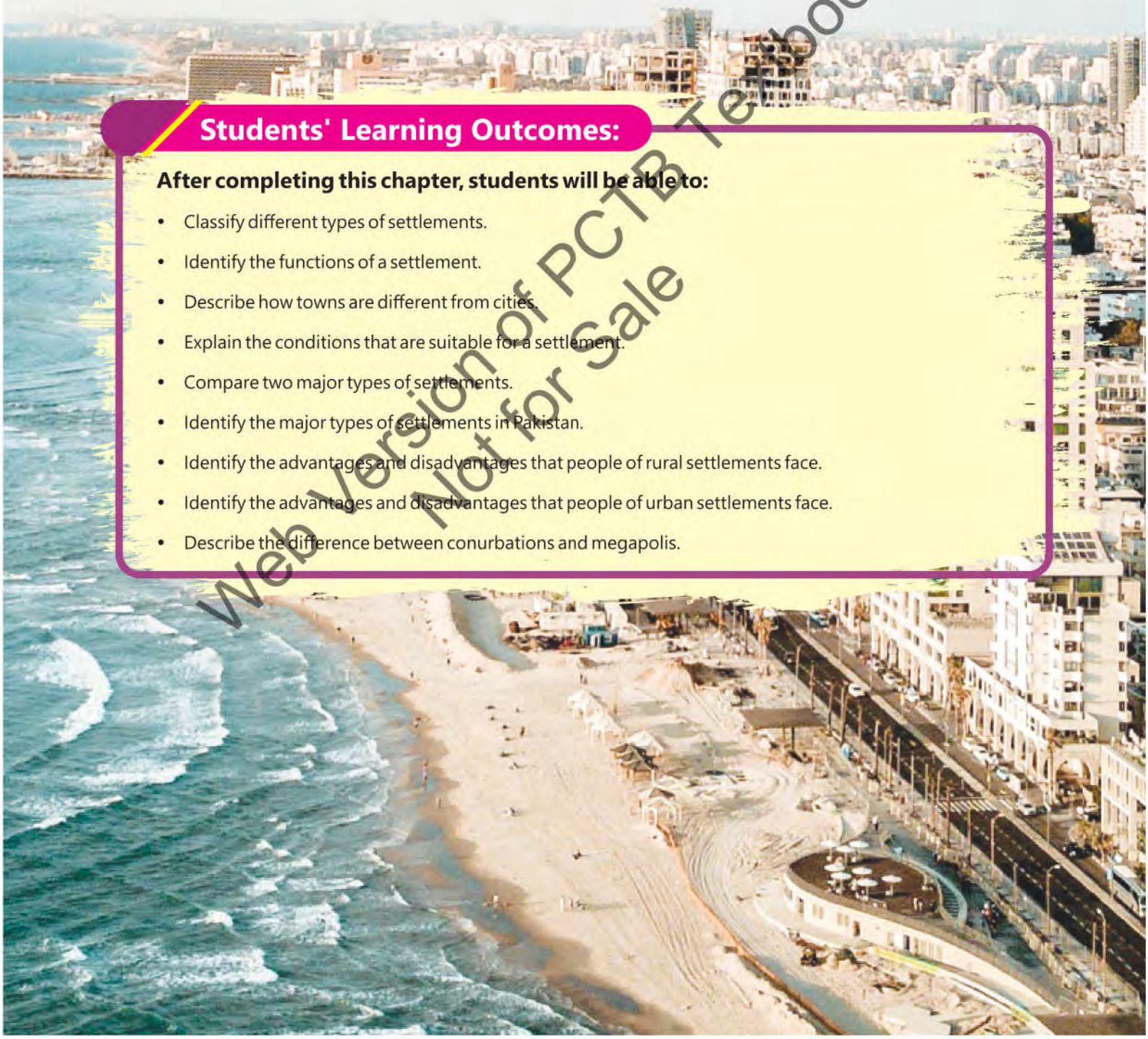
- Make a project on conservation of water purification methods.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Chapter 3

SETTLEMENTS AND LAND USE



Students' Learning Outcomes:

After completing this chapter, students will be able to:

- Classify different types of settlements.
- Identify the functions of a settlement.
- Describe how towns are different from cities.
- Explain the conditions that are suitable for a settlement.
- Compare two major types of settlements.
- Identify the major types of settlements in Pakistan.
- Identify the advantages and disadvantages that people of rural settlements face.
- Identify the advantages and disadvantages that people of urban settlements face.
- Describe the difference between conurbations and megapolis.

Web Version of PCTB Textbook
Not for Sale

Settlements

Settlements are places where people live together. Settlements can be small or large depending on how many people live there and how many facilities are there. Facilities can be schools for education, hospitals for patients, parks for playing and stores for shopping items, etc. Settlement may be permanent or temporary. An example of a temporary settlement is a refugee camp.

Settlement

Web Version of PCTB Textbook
Not for Sale

Do You Know?

Human settlements means the totality of the human community, whether city, town or villages with all the social, material, organizational, spiritual and cultural elements that sustain it".

Types of Settlements

According to the population and functions, there are two major types of settlements:

1. Rural Settlements
2. Urban Settlements

NOT FOR SALE (PESRP)

Nucleated Settlement

Dispersed Settlement

1. Rural Settlements

These are the primary settlements. The characteristics of these settlements are:

- They are small in size.
- They have small population.
- The majority of population is engaged in agriculture.
- They lack of facilities like proper education, medical and recreation, etc.

Types of Rural Settlements

According to formation, there are many types of rural settlements, some of which are as follows:

i. Dispersed Settlements

The settlements in which houses are situated far from each other are called dispersed settlements.

ii. Nucleated Settlements

The settlements in which houses are situated side by side are called nucleated settlements.

iii. Linear Settlements

The settlements which are situated along a river or a road are called linear settlements. They are usually elongated in shape.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Linear Settlement Nucleated Settlement Planned Settlement

iv. Planned Settlements

The settlements in which the streets and roads network follow a grid pattern are called planned settlements.

2. Urban Settlements

Foundation of urban settlements was laid when human beings mastered the skill of cultivation and got surplus production. The surplus production paved the way for trade which raised the standard of living of the people. This led to the change in the construction style of the houses and planned settlements began to appear.

Urban Settlement (Karachi)

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Now let us have a look on the characteristics of urban settlements:

- They are large in size.
- They have a big population.
- Most of the people in the cities are engaged in different services, industry and trade.
- Basic necessities of life i.e. education, medical, commercial and recreational etc. are abundantly available in the cities.
- Urban settlements are nucleated settlements according to form.

Settlement Hierarchy

Settlements can be arranged according to their size and functions. The bigger the size of settlement, the more will be the functions performed in it.

Let us have a look on this arrangement:

1. Hamlet

This is the smallest unit of settlements. It is comprised of a few houses, such settlement is called hamlet. There is no shops, school or even some time place of worship like Masjid.

2. Village

Village is bigger than hamlet. It is comprised of many houses, which are constructed near the agricultural lands. Mostly houses are single story which are constructed with mud and bricks.

3. Town

The settlement which is bigger than a village and smaller than a city is called a town. It has mixed characteristics of both village and city. Commercial areas, educational institutions, hospitals and Government offices are present in towns. Besides it, agriculture is also practiced within the limits of the town.

Web Version of PCTB Textbook
Not for Sale

4. City

A city is much bigger than a town and a village. It has a population in millions. Tall and huge buildings, schools, colleges, universities, hospitals, large commercial areas, offices, government institutions and recreational places are present in the cities.

5. Metropolitan City

Some cities of a country have special importance over the others. Some are capitals and some are important trading centers. These are called metropolitan cities. In Pakistan, the city with more than one million population is called a metropolitan city. Islamabad, Lahore and Karachi are metropolitan cities of Pakistan.

6. Megalopolis

The urban population of the world is rapidly increasing. That is why the cities are getting bigger and coming closer together. Such agglomeration of two or more big cities is called megalopolis.

Functions of a Settlements

The function of a settlement helps to identify the economic and social development of a place and can show its main activity. Most of large settlements have more than one function though in the past one function was may be the most important in defining the success and growth in importance of the settlement. The main functions of settlement are:

- **Market Town**

  A small town in a country side that has a regular market and acts as business centre for surrounding villages. Example of market town is Lahore, Faisalabad, Sheikhupura etc.

Web Version of PCTB Textbook
Not for Sale

Gawadar, a Port city

Murree, a resort city

NOT FOR SALE (PESRP)

- **Mining Town**

  A town where minerals and fuel may be extracted. **Example:** Pind Dadan Khan.

- **Industrial Town**

  A town where raw materials may be processed into manufactured products.

Example : Faisalabad.

- **Port City**

  A place where goods can be imported and exported. **Example:** Karachi.

- **Service Centre**

  A place that may provide for the main needs and services for people living in a particular area.

  Example: Lahore.

- **Cultural/ Religious Centre**

  A place that may welcome people from different places for learning or religious. observance.

  Example: Makkah and Medina cities of Saudi Arabia are religious centres.

- **Administrative Centre**

  A place where Government offices and departments may be located.

  Example : Islamabad.

- **Tourist Resort**

  Where people visit to relax and enjoy themselves. **Example :** Murree.

Towns are Different From Cities

A town is a populated area with fixed boundaries and a local government. A city is a large or important town.

City Settlement

Town Settlement

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

A City	A Town
• A city is considered the most developed urban centre in a country having advanced infrastructure systems, including housing, transportation, communication, and other social amenities. • Most cities have a central business downtown that serves as political, economic, and religious centres. • Cities also have public spaces like museum, parks, and sports facilities, etc.	• A town is a residential area that is smaller than a city and larger than a village. Town is an English word meaning "enclosure, garden, field or yard. • Towns are semi-rural communities which are popular in Pakistan, America and England. • Towns are not as easy to sport as cities because they are often joined with villages. Towns often grow around specialized economic activities, like agriculture and mining, etc.

Do You Know?

The sustainable city, eco-city, or green city is a city designed with consideration for social, economic, environmental impact, and resilient habitat for existing populations, without compromising the ability of future generations to experience the same.

Web Version of PCTB Textbook
Not for Sale

Conditions that are Suitable for a Settlement

The location and site play an important role in the origin and growth of a settlement. Location tells us where the settlement is situated while site is the actual ground on which the settlement is established. Some of the factors that have positive influence on developing a human settlement are:

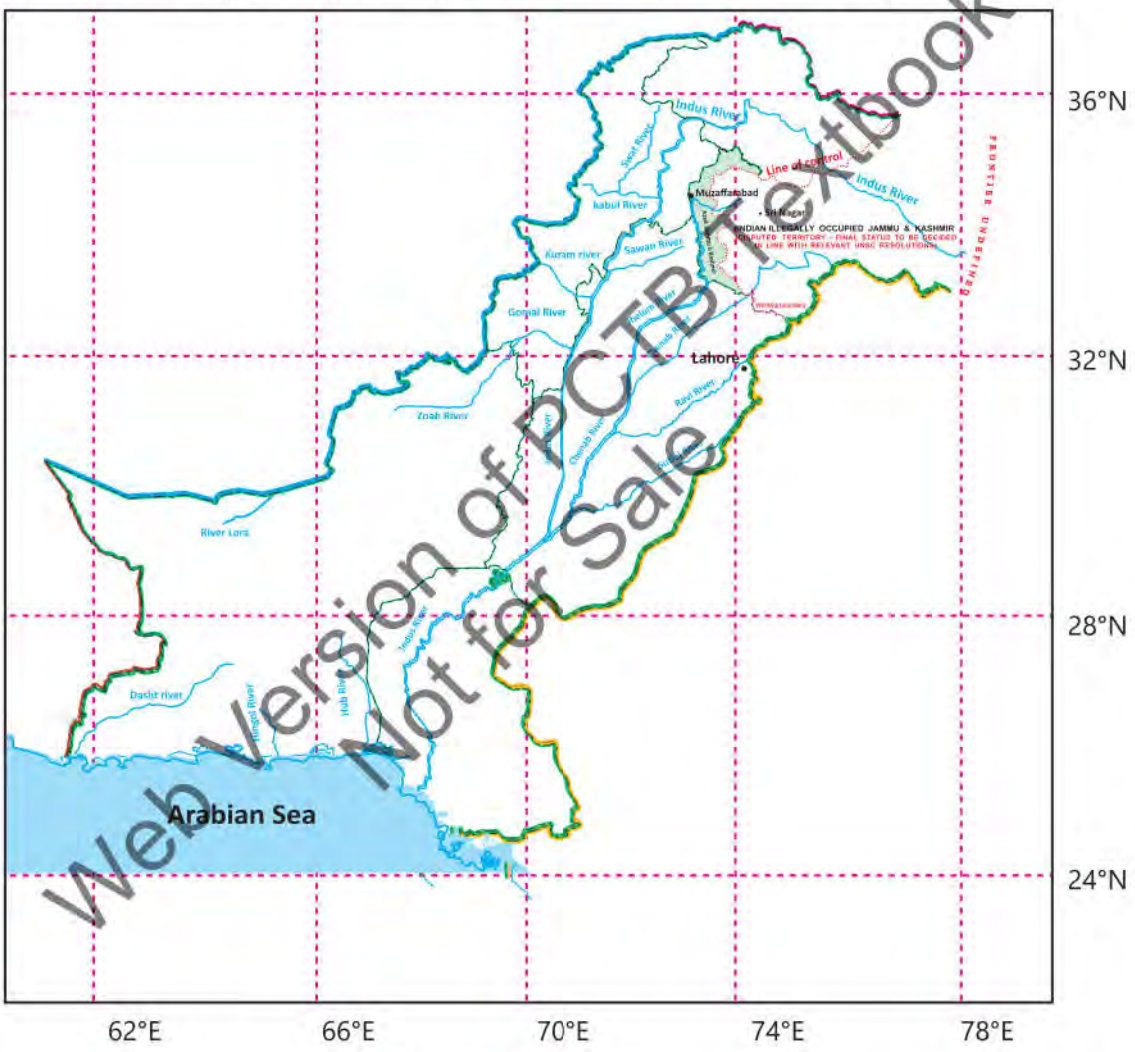
- water supply
- availability of building materials
- shelter from weather
- the climate of the region
- flat and arable land

NOT FOR SALE (PESRP)

- opportunities for protection and defense
- bridging point
- Areas that are marshy, steep or suspect to floods, no protection, no building or water supply, may be considered as not suitable for settlement

Activity:

Observe the following map. Location of Lahore can be described in two ways.



Map of Pakistan

E = East longitude
N = North latitude

i. Lahore is located at 32° north latitude and 74° east longitude.
ii. Lahore is situated on the eastern bank of the River Ravi.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Advantages and Disadvantages of Rural Settlements

Advantages of Rural Settlement	Disadvantages of Rural Settlement
• Villagers have strong social bonding and their life is simple . • The air that the rural people breath is pure.	• The roads and transport facilities are not good. • Less employment opportunities.
• Rural people live in beautiful natural surroundings.	• Less facilities of education.
• The food that the villagers take is fresh.	• Less facilities of health like big hospitals.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Advantages and Disadvantages of Urban Settlements

Advantages of Urban Settlement	Disadvantages of Urban Settlement
• Cities have roads of a better quality, parks shoping centers, markets and well-built houses.	• Urban areas tend to be more expensive to live in. • Houses are more compact in urban areas.
• Transport facilities are advanced and highly developed.	• Problem of air pollution is common in cities.
• Proper health care facilities are available.	• Problem of traffic congestion in cities.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

• The prime concern of the green agenda is to maintain the ecosystem health for a sustainable development. It focuses on issues of natural environment and ecosystem conditions and services, such as water availability, housing, etc.	• The brown agenda refers to issues of safe water provision, sanitation, and drainage; inadequate solid and hazardous waste management; and air pollution including uncontrolled emissions of toxic material.

Skills

- Investigate how the pattern of a settlement determines the lifestyle of the people living in it.
- Predict that there will be no land left on Earth if settlements will keep growing at the current pace.

Difference Between Conurbations and Megapolis

A conurbation is a region comprising a number of metropolises, cities, large towns, and other urban areas that, through population growth and physical expansion, have merged to form one continuous urban or industrially developed area.

Megalopolis is a large and densely populated city or group of towns that make up an urban complex. New York City and surrounding areas including Long Island is an example of a megapolis.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

What We Have Learnt!

1. A village may also have houses, a primary school, a few shops, a post office and a village hall.
2. A hamlet is a very small settlement with just a few houses.
3. A town is larger than a village, with lot of houses, primary and secondary schools, as well as sometimes having a railway station and shopping centre.
4. A city is the largest type of settlement, containing lot of buildings and people. They usually have hospitals, sports facilities, universities, shops, offices and many houses.
5. In market town, farmers buy and sell their goods and materials.
6. In the recent 2017 census, a little change is found with 63% of the total population is rural and 37% is urban.
7. Rural people live in beautiful natural surroundings.
8. A conurbation is a region comprising a number of metropolises, cities, large towns, and other urban areas.

Web Version of PCTB Textbook
Not for Sale

Critical Thinking Questions:

- How did human life styles change with settlements?
- How do settlements change over time?
- How can be settlements be more sustainable?
- Explore the possible problems, threats that cities may face in future.

NOT FOR SALE (PESRP)

EXERCISE

Q.1: Tick (✓) the correct answer.

i. It is the largest type of settlement, containing lot of buildings and people:
   (a) village (b) town
   (c) city (d) hamlet

ii. In the recent 2017 census, Pakistan's urban population is about:
   (a) 30% (b) 32%
   (c) 34% (d) 37%

iii. The place where people visit to relax and enjoy themselves is called:
   (a) Tourist resort (b) Residential town
   (c) Business centre (d) Town market

iv. By population, the biggest city of Pakistan:
   (a) Lahore (b) Karachi
   (c) Faisalabad (d) Islamabad

v. A place where goods can be imported and exported is called:
   (a) Industrial town (b) port
   (c) route centre (d) service centre

Q. 2: Give short answers of the following:

i. What is meant by administrative centre?
ii. Define the term route centre.
iii. What kinds of activities are held in an industrial town?
iv. Differentiate between Conurbations and Megapolis.
v. Define the term Settlement.

Q. 3: Write the answer of the following in detail:

i. Analyze the different types of settlements.
ii. Explain the functions of a settlement.
iii. Describe how towns are different from cities.
iv. Discuss the conditions that are suitable for a settlement.
v. Compare two major types of settlements.
vi. Describe, the major types of settlements in Pakistan.
vii. Highlight the advantages and disadvantages that people of rural settlement face.
viii. Highlight the advantages and disadvantages that people of urban settlement face.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Learning Activities:

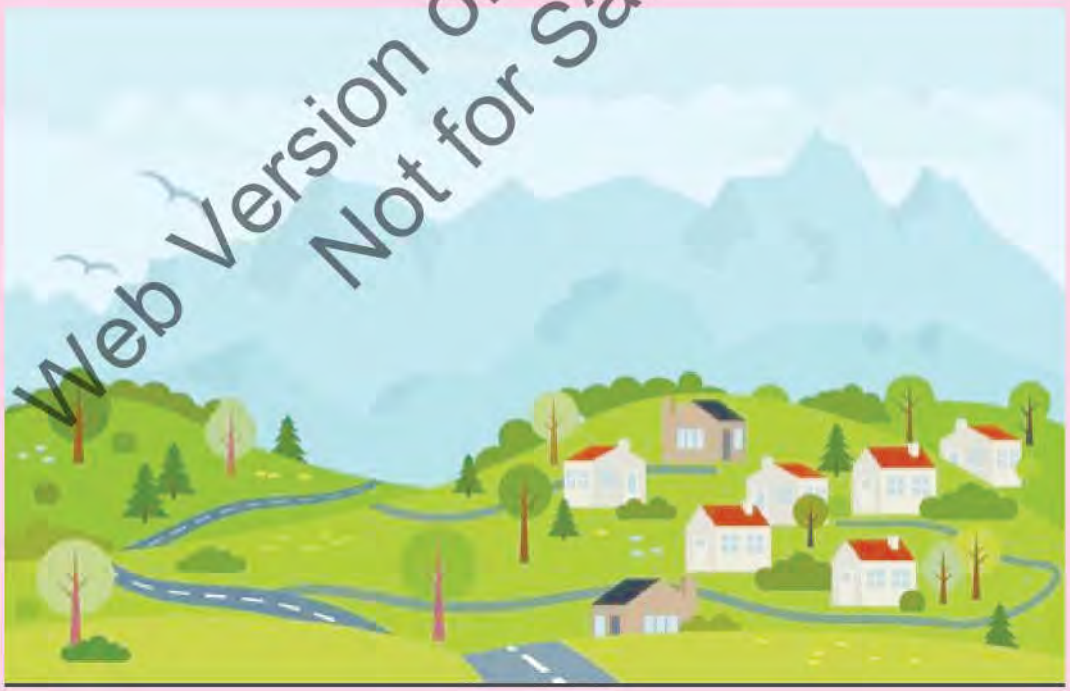
The Teacher will:

i. Use diagrams or presentations to explain different aspects of commercial and residential land use.

ii. Demonstrate their knowledge to build students' understanding for the settlement.

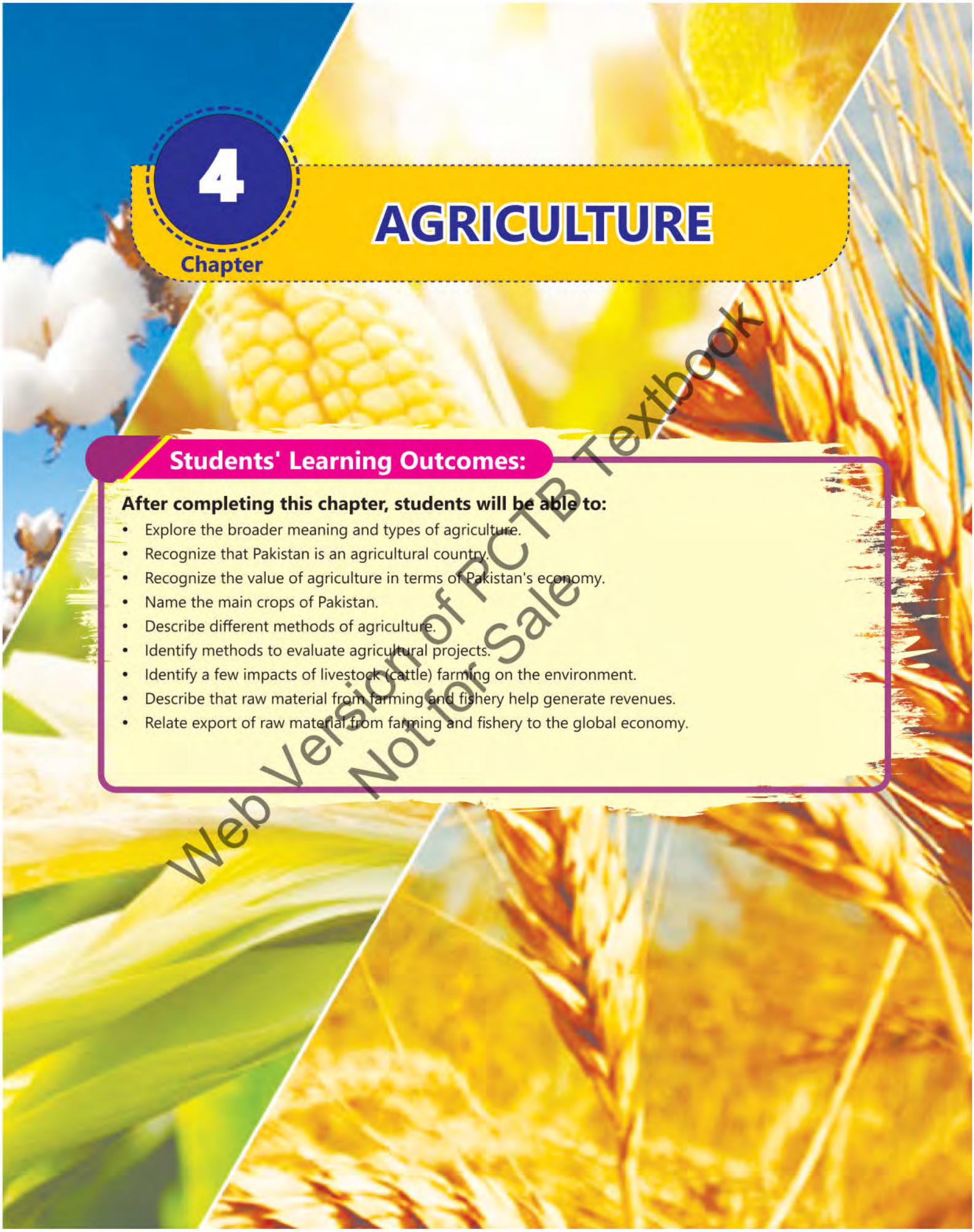
Projects For Students:

- Make a Model of any type of settlement and share with your classmates.



Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)



Chapter 4

AGRICULTURE

Students' Learning Outcomes:

After completing this chapter, students will be able to:

- Explore the broader meaning and types of agriculture.
- Recognize that Pakistan is an agricultural country.
- Recognize the value of agriculture in terms of Pakistan's economy.
- Name the main crops of Pakistan.
- Describe different methods of agriculture.
- Identify methods to evaluate agricultural projects.
- Identify a few impacts of livestock (cattle) farming on the environment.
- Describe that raw material from farming and fishery help generate revenues.
- Relate export of raw material from farming and fishery to the global economy.

Web Version of PCTB Textbook
Not for Sale

Agriculture

Cultivation of crops and farming of cattle is called agriculture, or husbandry. Most of the world population is associated with agricultural sector directly or indirectly. Agricultural sector provides a major part of raw material to certain industries. For example, raw cotton to cotton textile industry.

Agriculture

Web Version of PCTB Textbook
Not for Sale

Types of Agriculture

Agriculture is an ancient human activity. It provides employment to many people. Different types of cultivation are described below:

1. Subsistence Agriculture

In subsistence agriculture, the farmers focus on growing enough food crops to feed themselves and their families. Most of the fields are small where the use of modern machinery is not possible. This type of agriculture is practiced in south Asia, south-eastern Asia and China, etc.

NOT FOR SALE (PESRP)

2. Intensive Agriculture

In this type of agriculture, better production is obtained from a small area. By using good fertilizers, water and pesticides on a small piece of land, abundant crop and better financial gains are obtained. This type of agriculture is found mainly in UK, France, Pakistan, India, China, Bangladesh, Indonesia and Egypt, etc.

Subsistence Agriculture

Intensive Agriculture

3. Extensive Agriculture

This type of agriculture is practiced in countries where vast lands for cultivation are available. In USA, Canada, Russia, Australia and Brazil, etc. the land is more than population, so modern machinery is used for agriculture on a large scale.

Truck Farming

Extensive Agriculture

4. Truck Farming

Perishable fruit and vegetables are brought to market in trucks, hence the name is called truck farming. Big cities and industrial centres play a vital role to encourage this type of agriculture because they have markets. Instant profits are earned by selling the products. Coastal areas of USA are important centres of truck farming.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

5. Plantation Agriculture

In this type of agriculture, single crop is grown particularly for commercial purpose. This includes sugarcane, banana, coconut, tea and coffee, etc. This type is commonly found in south-east Asia, Africa, USA, Malaysia, Indonesia and Sri Lanka. The fields for this type of agriculture are usually vast.

Plantation Farming

5. Commercial Agriculture

This type of agriculture is for commercial purposes. Crops are produced on a large-scale to earn profit. In some parts of Canada, USA, Australia and Argentina, etc. commercial agriculture is practised.

7. Mixed Farming

In this type of agriculture, crop growing and cattle breeding is done simultaneously. In some regions, this type is practiced to meet the local requirements, whereas in other parts it has commercial objectives. Mixed farming is found in USA, Mexico, Brazil, south Africa, Europe and some parts of Asia.

Mixed Farming

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

8. Cereal Farming

In this farming, cereal crops are cultivated to meet local requirement. Main cereal crops of Pakistan include wheat, rice, gram and various lentils.

Do You Know?

Pakistan agriculture is linked with canal system. This canal system of Pakistan consists of dams, barrages and canals. Most of the canals of Pakistan are perennial, and they have water throughout the year.

Pakistan-An Agricultural Country

In Pakistan, development of agriculture is linked with the irrigation, where 83% of total cultivatable area of Pakistan depends upon it. Cultivation of crops by using irrigation system is called irrigated agriculture.

Agriculture Growth (Base=2015-16) %

Sector	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22 P
Agriculture	2.22	3.88	0.94	3.91	3.48	4.40
1. Crops (i+ii+iii)	1.37	4.61	-4.38	6.32	5.96	6.58
i) Important Crops	2.68	4.27	-8.59	5.24	5.83	7.24
ii) Other Crops	-1.24	4.65	3.62	9.21	8.27	5.44
iii) Cotton Ginning	5.24	8.27	-11.23	-4.06	-13.08	9.19
2. Livestock	2.89	3.59	3.65	2.80	2.38	3.26
3. Forestry	-2.92	2.24	7.22	3.36	-0.45	6.13
4. Fishing	1.22	1.57	0.78	0.63	0.73	0.35

P: Provisional Source: Pakistan Bureau of Statistics

Web Version of PCTB Textbook
Not for Sale

In the areas where underground water is not suitable for cultivation and canal water cannot reach, agriculture is mainly dependent on rain water. This is called rainfed agriculture. This type of agriculture is practised in desert areas, plateaus and mountainous regions. In Pakistan, rainfed agriculture is commonly found in the districts of Muzaffargarh, Layyah, Bhakkar and Bahawalpur, etc. where spiked millet, pearl millet, wheat, maize and mustard are grown in adequate amount.

Pakistan has hot and dry climate. Northern and hilly areas of Pakistan receive reasonable rains, but rest of the country is dependent on irrigation for agriculture or farming. Canals are most important means of irrigation, while other means include tube wells, Karez system, wells, springs and pools, etc.

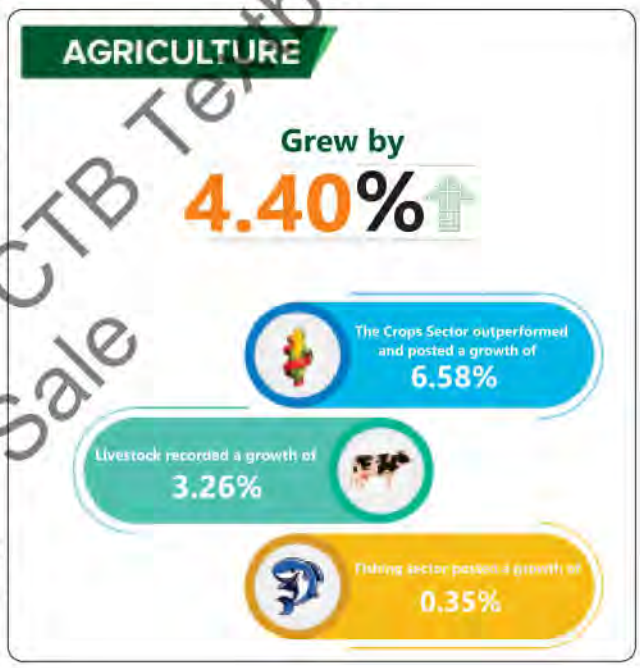
In mountainous regions of Pakistan, both rainfed and irrigated types of agriculture are

NOT FOR SALE (PESRP)

practised. In Swat, Chitral, and Dir, etc. water of natural springs is used for irrigation through small water courses. Crops of wheat, maize, fruits and vegetables, etc. are usually cultivated in mountainous regions.

Value of Agriculture in Terms of Pakistan's Economy

- Agriculture plays a very vital role for economy of Pakistan and its development.
- 37.4% of labour force is engaged directly with agriculture.
- It is the main source of living or income of the major part of our economy.
- About 70% of population is related to agriculture directly or indirectly.
- Agriculture is the major source of food of huge population of Pakistan.
- Agriculture is also the major source of provision of raw martial to industrial sector of Pakistan.
- Its contribution towards GDP is about 22.7% which is higher than the contribution of any other sector.
- Agricultural sector is very effective in maintaining the balance of payments for Pakistan.
- Agricultural sector is the biggest source of foreign exchange earnings for Pakistan.



Web Version of PCTB Textbook
Not for Sale

Main Crops of Pakistan

Main crops of Pakistan are divided into two major seasons: Rabi and Kharif. Rabi crops are sown in winter from October to December and harvested in summer from April to June. These include wheat, barley, gram, oil seeds, etc. Kharif crops are sown during the onset of the monsoon season, around June, and harvested at the end of this season, during September and October. Examples are Jowar, Maize, Millets and Rice. In Pakistan food and cash crops are grown. Food crops like rice, wheat, maize and millet, etc. cater the food requirements of growing population of the country.

Crops harvested for the purpose of making profit are called cash crops. Cotton, Rice, Sugarcane, Tobacco, are cash crops.

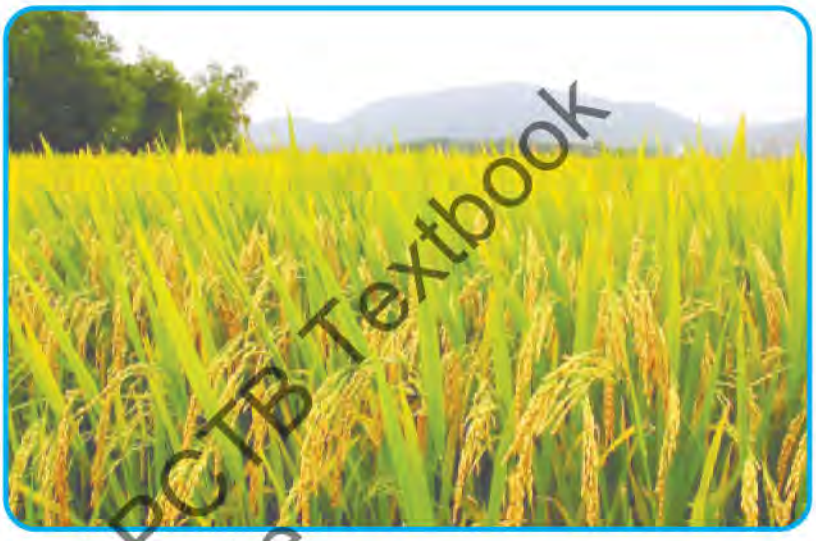
These crops are an important source of industrial raw material domestically. Different

NOT FOR SALE (PESRP)

types of lentils and fruits are also harvested in our country. Pakistan is famous for its fruit. All provinces of Pakistan produce fruits. Important fruits are mango, citrus fruit, grapes, apple, plums, apricot, dates and peach, etc. Fruit in large quantity are also exported to other countries. Major crops of Pakistan are described below:

1. Rice

Rice is an important Kharif crop in Pakistan. Hot humid climate, abundant rains and rich soft soil is best suited for this crop. Not only hot climate is necessary at the time of its sowing, but water should remain standing in its fields. Extra flooding and abundant rain is favorable for rice crop. Pakistan has two major rice-producing provinces, namely Punjab and Sindh. Both provinces account for more than 88% of total rice production of Pakistan.



Rice

2. Wheat

Wheat is most important Rabi crop of Pakistan. Levelled soil is necessary for it so that watering become easy. Two- third of this crop is grown in canal irrigated areas. Total area under this crop is cultivated is around Nine millions (FAO) hectares. In dry areas other than canal irrigated lands of the country, it is grown where winter and summer rains are sure and abundant. Multan, Sahiwal, Faisalabad, Sargodha, Muzaffargarh, Jhang, Bahawalpur and Dera Ghazi Khan in Punjab, Sukkur, Hyderabad, Nawabshah and Khairpur in Sindh, Dera Ismail Khan, Peshawar, Bannu, Charsaddah and Mardan in Khyber Pakhtunkhwa, and Naseerabad and Khuzdar in Balochistan province are important areas for wheat cultivation and production.

Wheat

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

3. Maize

Maize is used for food and animal fodder. It is an important Kharif crop. Most of the maize is grown in the plains of Peshawar and Mardan in Khyber Pakhtunkhwa, and Sahiwal, Muzaffargarh, Jhang, Bahawalpur, Dera Ghazi Khan and Okara, etc. areas in Punjab.

Maize

4. Cotton

Pakistan produces 5% of the world's total cotton. It is an important cash crop of Pakistan. Land with good drainage facilities is most suitable for its cultivation. At the time of cultivation, weather should be hot and dry. Three-fourth of the total cultivation area of Pakistan is in Punjab and remaining is in other provinces. Cotton crop also provides raw material for textile and banaspati ghee industries.

Cotton

Dera Ghazi Khan, Muzaffargarh, Jhang, Bahawalpur, Multan, Sahiwal, Faisalabad in Punjab, Thatta, Badin, Sukkur, Sanghar, Nawabshah, Khairpur and Tharparkar in Sindh province, Dera Ismail Khan and Bannu in Khyber Pakhtunkhwa, and Naseerabad, Jafferabad and Qalat in Balochistan province are important areas for cotton production.

5. Sugarcane

Sugarcane is another cash crop of Kharif season. Sugarcane fields are mostly found in areas with better irrigation system. It is grown in Peshawar and Mardan districts of Khyber Pakhtunkhwa and in central and south Punjab, Sukkur, Hyderabad and Larkana in Sindh.

Sugarcane

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Other than the crops described above, tobacco crop in Pakistan is also a source of raw material for cigarette industry. Barley, Pearl millet and gram crops are grown in dry, sandy and less fertile lands where irrigation facilities are not specially provided. Pakistan is famous for its fruit like peach, pomegranate, almond, plum, pear, apricot, orange, lemon and mango in the world.

Vegetables of best quality, like potato, cauliflower, tomato, onion, green chilli, radish, cucumber, okra, gourd, turnip, brinjal, peas are also grown in Pakistan.

Fruits and Vegetables

Skills

- Compare and contrast different methods of farming.
- Differentiate between cash and staple crops.
- Use maps to locate agricultural areas and products of Pakistan.
- Analyze the factors (challenges) that affect agricultural yield.
- Analyze challenges related to livestock farming in Pakistan.

Different Methods of Agriculture

Traditional farming is an old method of farming which has been used since centuries. Over the years, the technology has advanced and modern equipments are introduced in farming to make it quick and efficient. In spite of the modern farming being used extensively, few methods of traditional farming are still used today and are also popular. The five traditional farming methods which are still popular today are as follows:

Old Method of Agriculture

1. Agroforestry

Agroforestry is one of the oldest farming methods that have been practised since earlier times. It is basically planting and maintaining trees that can protect the crops by developing the microclimate. This forestry technique is useful in controlling the temperature, exposure of

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

sunlight, wind and rain. This combination of agriculture and forestry has lot of benefits. Due to this method, we can get multiple products like food, timber, firewood, etc. Staple food crops which cannot be produced otherwise can be grown by this method.

Agroforestry

Other benefits from this method are generating income for farmers, improving in the soil structure and quality, reducing soil erosion, storing carbon, etc. This kind of method is commonly found in African continents, Europe and United States. This method has led to production to diversify crops and ecosystem services.

2. Crop Rotation

The practice of growing different crops on the same land based on seasons is crop rotation. It has a lot of advantages. It helps in preserving the soil productivity, reducing pests, minimizing use of chemicals and maximizing yields.

Crop Rotation

3. Intercropping/Mixed Crops

Sowing more than two crops at the same time is called intercropping/mixed cropping. Usually the resources are not utilized properly by a single crop. Hence, to produce a greater yield on a piece of land, intercropping is used.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

4. Poly Culture

Poly culture is a method to grow many plants of different species in the same area. It increases the plant biodiversity and helps in promoting the diversity in diet in local communities.

The main advantage of poly culture is its ability to control weeds, pests and diseases without the usage of chemicals. Poly culture is the sustainable form of agriculture. It helps in reducing soil erosion and increase in stable yields. It also improves the quality of soil.

Poly Culture

5. Monoculture

Monoculture is growing a single crop in a large area. Farmers decide about which is the best crop, and grow only that. This is very common in modern agriculture, as it simplifies the farm and allows relatively few people to harvest large amounts. Monoculture have problems, however pests and diseases that attack only one kind of plant can spread more easily when they only find that kind. Each kind of plant also needs particular nutrients from the soil. Fertilizers are used to supply that nutrient.

Monoculture

Web Version of PCTB Textbook
Not for Sale

Skills

- Predict changes in the structure of agricultural production in the future.
- Evaluate the impact of agriculture on the environment.
- Evaluate the importance of agriculture for Pakistan in terms of Pakistan's economy.
- Suggest ways for agricultural improvements in Pakistan.

Methods to Evaluate Agricultural Projects

Agricultural project means any project proposing agricultural uses such as commercial farming (e.g., row, field, tree, and nursery crop cultivation) or animal husbandry (e.g., cows, goats,

NOT FOR SALE (PESRP)

and poultry)

The overall objective of project is to improve effectiveness and sustainability of investments in the agricultural sector aimed at fostering food security and agricultural led economic growth. The project encompasses the following three main components :

(i) Institutional development and capacity building

(ii) Sustainable food security

(ii) Project coordination

The project evaluates three methods to disseminate agricultural technologies:

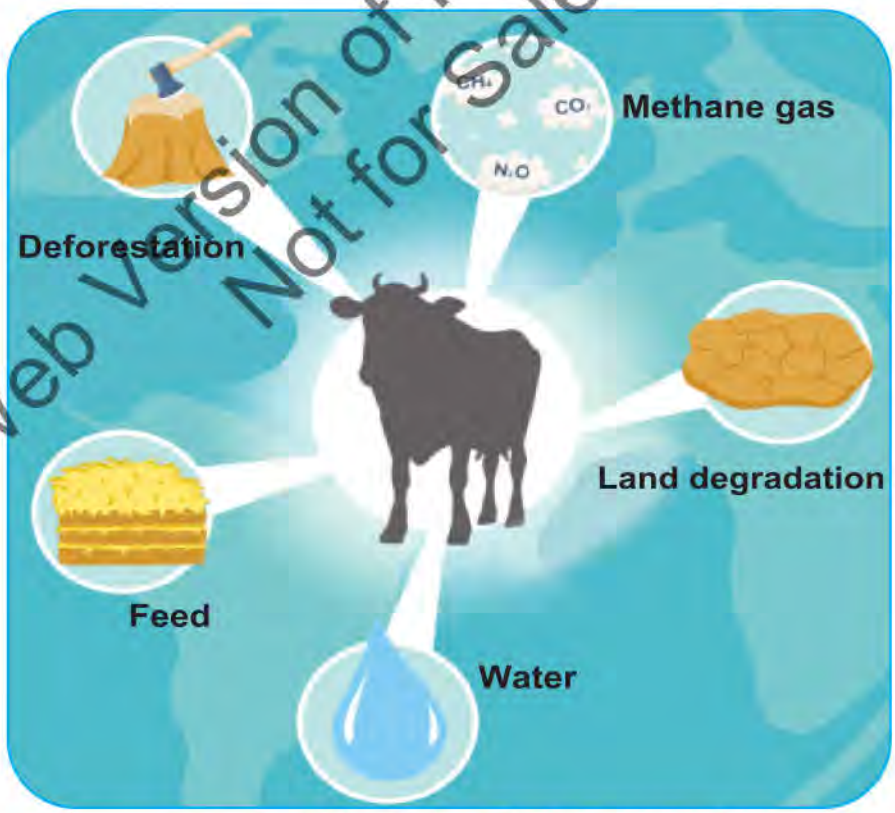
(a) Lead farmer (a smart, receptive and influential farmer)

(b) Peer farmer (a group of receptive and influential farmers)

(c) Extension worker (All participating farmers and extension workers receive incentives).

Impacts of Livestock (Cattle) Farming on the Environment

The livestock sector includes a wide variety of animals like buffalo, cattle, goats, sheep, poultry, camels, asses, horses and mules, etc. The livestock industry has numerous and diverse impacts on the environment.



Impacts of Livestock on the Environment

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

- It contributes to land and water degradation
- Biodiversity loss
- Acid rain
- Coral reef degeneration
- Deforestation

These impacts are more apparent than climate change. Livestock farming contributes 18% of greenhouse gas productions in the world .

Raw Materials from Farming and Fishery Help to Generate Revenues

Agriculture products also include a variety of specialties, such as fish, timber, fur-bearing animals, trees, shrubs, flowers, herbs and much more. Most of the products we use in everyday like come from agriculture. The sheets we sleep on and the dresses we wear are made from cotton. The raw materials produced in agriculture generates revenues.

Raw Material From Farming

- Palm oil and Soyabean for making cooking oil
- Cotton for making cloths
- Wood for making furniture
- Wheat for flour
- Maize for flour and food purpose

Raw Material From Fishery

The fisheries in the Pakistan make a significant contribution to the national economy in terms of income and employment. Small bony whole fish used for the production of fishmeal and fish oil. Fish is used in fish cutlet, fish balls, fish pickle, prawn pickle, fish soup powder and fish wafers, etc.

Web Version of PCTB Textbook
Not for Sale

Activity:

- Relate export of raw materials from farming and fishery to the global economy.

NOT FOR SALE (PESRP)

What We Have Learnt!

1. Agriculture plays a vital role in economic growth and development of Pakistan.
2. Subsistence agriculture is self sufficiency in farming in which the farmers focus on growing enough food crops to feed themselves and their families.
3. In intensive agriculture, crop growing and cattle breeding is done simultaneously.
4. In commercial agriculture crops are produced on a large-scale to earn profit.
5. Sowing more than two crops at the same time is called intercropping/mixed cropping.
6. Traditional farming is an old method of farming which has been used since centuries.
7. Vegetables of best quality, like potato, cauliflower, tomato, onion, green chilli, radish, cucumber, okra, gourd, turnip, brinjal, peas, etc. are grown in Pakistan.
8. Fisheries make a significant contribution to the national economy in Pakistan .

Web Version of PCTB Textbook
Not for Sale

Learning Activities:

The Teacher will:

i. Draw diagrams or give a presentation to explain different methods to evaluate agricultural projects.

ii. Use sources of information like the Internet, newspapers, news channels, radio, etc. to explain how the government is supporting farmers .

NOT FOR SALE (PESRP)

EXERCISE

Q.1: Tick (✓) the correct answer.

i. Percentage of total World's cotton produced by Pakistan:

(a) 2 % (b) 3 %

(c) 4 % (d) 5 %

ii. The crop used for food and animal fodder:

(a) Wheat (b) Maize

(c) Gram (d) Cotton

iii. The contribution of agriculture in Pakistan's GDP is:

(a) 15% (b) 20%

(c) 25% (d) 30%

iv. The method for growing many plants of different species in the same area:

(a) Crop Rotation (b) Subsistence Agriculture

(c) Agroforestry (d) Polyculture

v. Main crops of Pakistan are divided into major seasons:

(a) two (b) three

(c) four (d) five

Web Version of PCTB Textbook
Not for Sale

Q. 2: Give short answers of the following:

i. What is meant by agriculture?

ii. What is intercropping/mixed cropping?

iii. Write the name of five raw material obtained from farming.

iv. Name important crops of Pakistan.

v. Write the uses of cotton in three lines.

Q. 3: Write the answer of the following in detail:

i. Explain the importance of agriculture in terms of Pakistan's economy.

ii. Describe different types of agriculture.

NOT FOR SALE (PESRP)

iii. Analyze the distribution of major crops in Pakistan.

iv. Write your point of view that Pakistan is an agricultural country.

v. Analyze the different methods of agriculture.

vi. Enlist a few impacts of livestock (cattle) farming on the environment.

vii. Discuss that raw material from farming and fishery help to generate revenues.

Critical Thinking Questions:

- What is the most challenging issue facing agriculture today?
- How can agriculture be a solution to a country's growth?
- What is Organic Farming and why is it important?
- What are the health risks, posed by the GMO Foods?

Projects For Students:

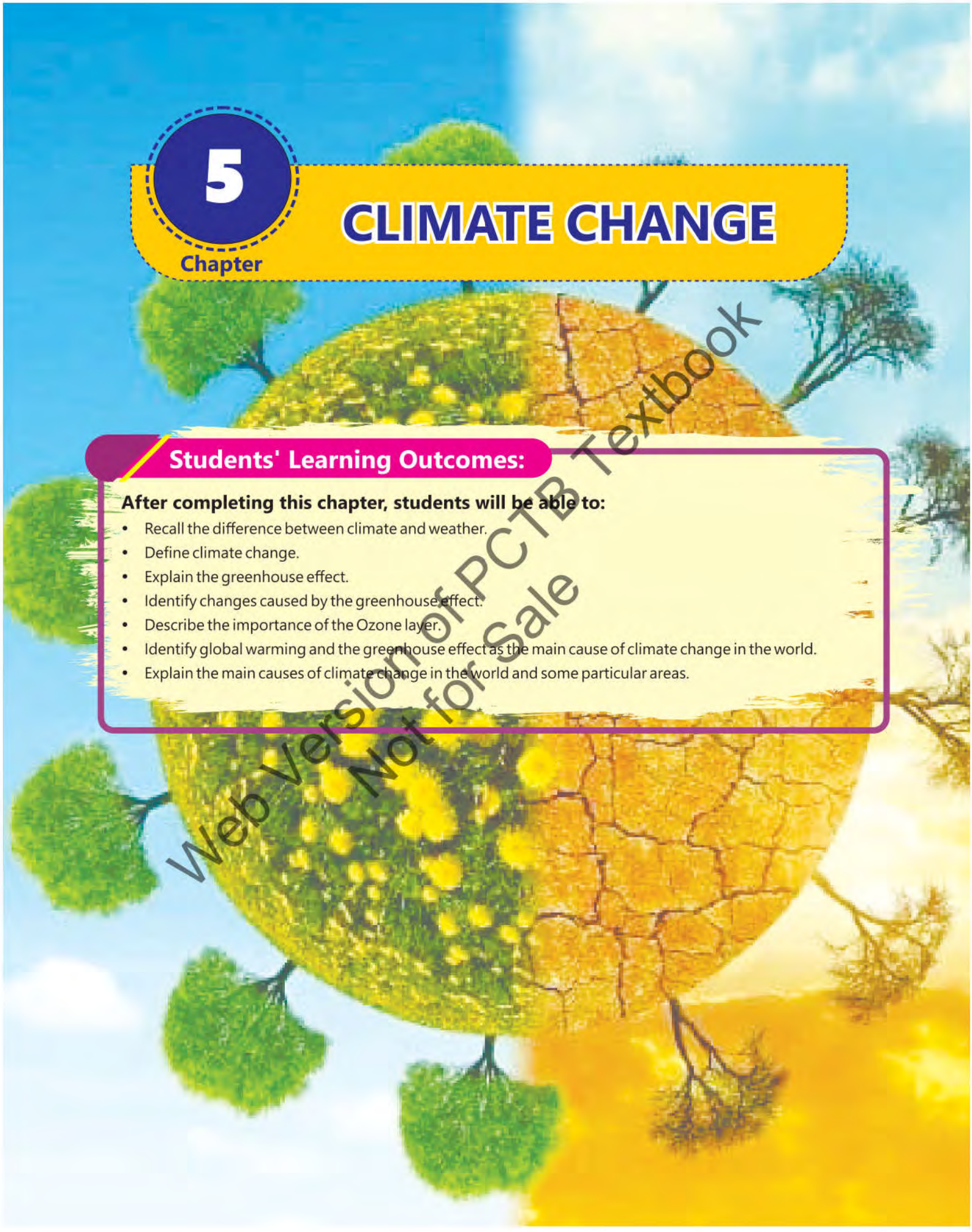
- Make a project on any one of the following topics.

Agriculture Project Topics

- Problem and prospects of small scale fish farmers.
- Effect of rural-urban migration on agricultural production.
- Problems of deforestation.
- Problem affecting small scale farmers.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)



Chapter 5

CLIMATE CHANGE

Students' Learning Outcomes:

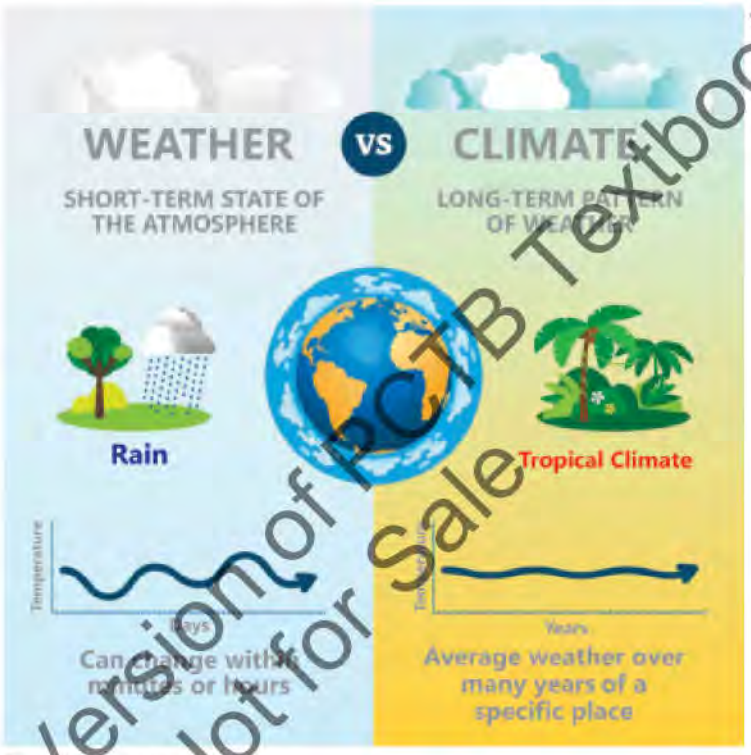
After completing this chapter, students will be able to:

- Recall the difference between climate and weather.
- Define climate change.
- Explain the greenhouse effect.
- Identify changes caused by the greenhouse effect.
- Describe the importance of the Ozone layer.
- Identify global warming and the greenhouse effect as the main cause of climate change in the world.
- Explain the main causes of climate change in the world and some particular areas.

Web Version of PCTB Textbook
Not for Sale

Difference Between Weather and Climate

Weather is the whole condition of temperature, atmospheric pressure, wind speed, air humidity and precipitation (rain and snow) of a particular place at a particular time. Weather changes with time while the climate is the average weather condition of a particular place that persists there for long time. It is usually taken over 25 to 35 years. The only difference between weather and climate is that weather is short term study of atmospheric condition while climate is long term study of atmospheric conditions.



Weather and Climate

Web Version of PCTB Textbook
Not for Sale

Climate Change

Carbon dioxide (CO_2) and other Green House Gases (GHGs) absorb the heat coming from the Earth. It increases the temperature of atmosphere which is harmful for life on the Earth. In this way, the climate of the world is affected and it is changing due to rise in air temperature. When volcanism occurs, dust particles and gases, etc. are released in air in huge amount which results in changing the

Climate Change

NOT FOR SALE (PESRP)

climate. Similarly emissions of nitric oxide (NO_2) from vehicles and industrial emission like Sulphur dioxide (So_2) are also polluting the air. A specific amount of carbon dioxide (CO_2) is necessary for life on the Earth. But the quantity of carbon dioxide is rapidly increasing due to excessive use of energy resources such as fossil fuels (coal, oil, natural gas, etc). This change is due to some natural as well as human activities.

Skills

- Use weather charts and climatic maps to identify main areas where major climatic changes are occurring.

The atmosphere of the Earth changes due to the activities of human beings. Humans make roads, buildings and dams, etc. to fulfill their needs. In 2009, an International Conference was held in Copenhagen (capital of Denmark) on the issue of climate changes. Many countries of the world participated in this conference. Many decisions were taken in this conference to reduce the release of carbon dioxide to control the trend of increasing temperature on the Earth.

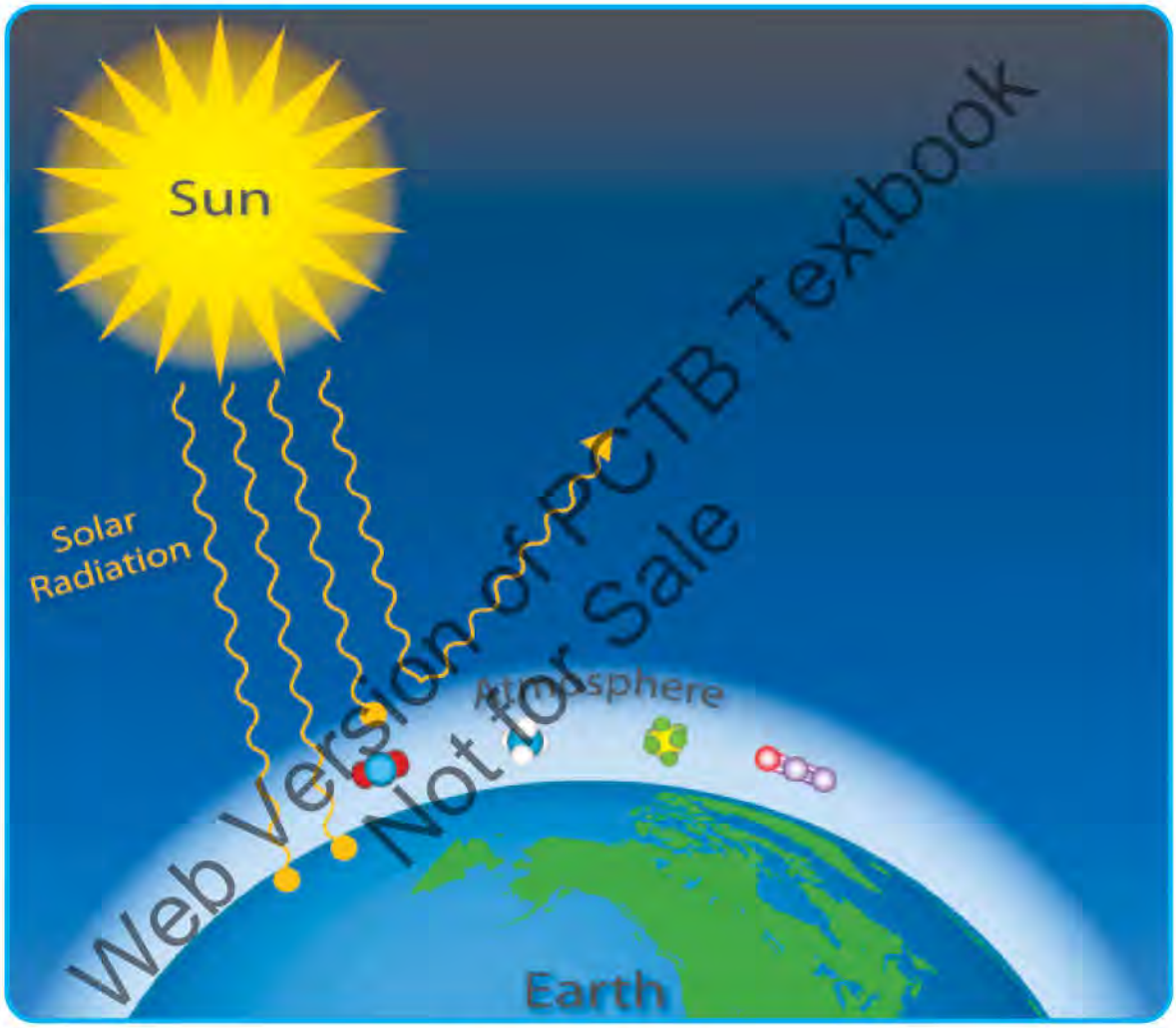
Copenhagen Conference 2009

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Greenhouse Effect

The greenhouse effect is the way in which heat is trapped close to the Earth's surface by "greenhouse gases." These heat-trapping gases can be imagined as a blanket wrapped around the Earth, keeping the planet warmer. Greenhouse gases include carbon dioxide, methane and water vapours.



Web Version of PCTB Textbook
Not for Sale

Greenhouse Effect

Scientists have determined that warming effect of carbon dioxide helps to stabilize the Earth's atmosphere. Without carbon dioxide, global greenhouse effect would collapse. Without carbon dioxide in the Earth's surface would be 33°C (59°F) cooler.

Greenhouse gases occur naturally and are part of our atmosphere's makeup. The level of carbon dioxide in Earth's atmosphere has been rising consistently for decades and traps extra heat near Earth's surface, causing temperature to rise. This is called global warming i.e. the long-term

NOT FOR SALE (PESRP)

heating of Earth's surface observed since the pre-industrial period (between 1850 CE and 1900 CE) due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in the Earth's atmosphere.

Do You Know?

Carbon dioxide (CO_2) produced by human activities is the largest contributor to global warming. By 2020 CE, its concentration in the atmosphere had risen to 48 % above its pre-industrial level (before 1750 CE).

Changes Caused by the Greenhouse Effect

The main driver of climate change is the greenhouse effect. Greenhouse Effect has far-ranging environmental and health effects. It causes climate change by trapping heat. It also contributes to respiratory diseases from smog and air pollution. Extreme weather, food supply disruptions, and increased wildfires are other effects of climate change caused by greenhouse effect. Changes caused by the greenhouse effect are given as under:

- Flooding of coastal cities.
- Desertification of fertile areas.
- Melting of glacial masses.
- Proliferation of devastating hurricanes.
- Rising of sea level.
- Loss of property.
- Migration from coastal areas to cities.

Skills

- Investigate how human activity is causing climate change.
- Investigate the effects of global warming on polar regions.
- Analyze the effect of climatic change on people, lifestyle, and economy.

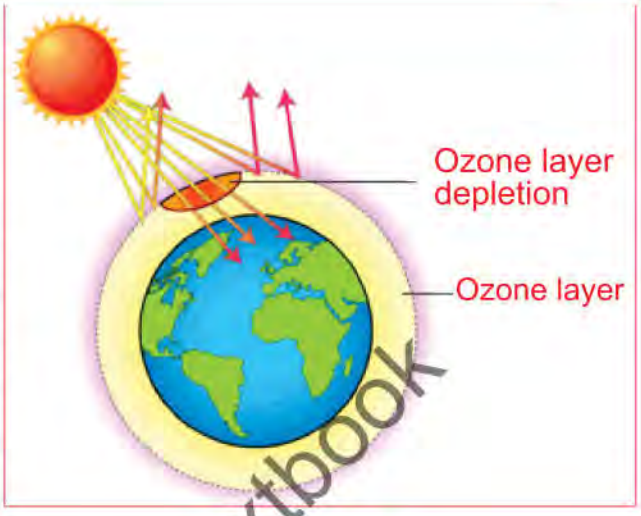
Ozone Layer

Ozone is one of the atmospheric gases. Ozone is produced and destroyed naturally. It is present in the upper portion of atmosphere. It does not let the ultraviolet rays to reach on the Earth. Ultraviolet rays cause skin cancer and eye diseases. If the quantity of ozone gas decreases,

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

the ultraviolet rays will reach the Earth, which is harmful for life. Therefore, the presence of ozone is necessary.



Ozone Layer

Causes of Ozone Layer Depletion

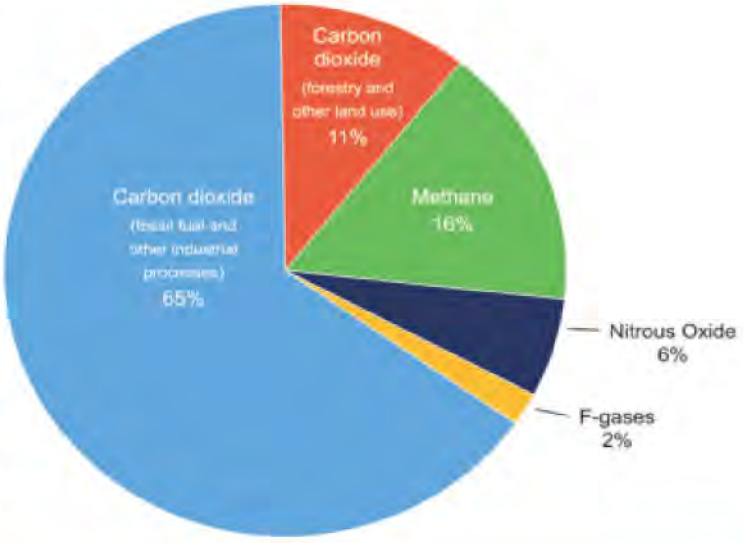
Ozone layer depletion is the thinning of the ozone layer present in the upper atmosphere. This happens when the chlorine and bromine atoms in the atmosphere come in contact with ozone and destroy the ozone molecules (O_3). During the industrial revolution, the ozone layer is rapidly depleting because of human activities such as Chloro-Flouro-Carbon (CFCs) which is used in refrigerators and other home appliances.

Skills

- Analyze the effects of climate change on the Earth.
- Evaluate the health and environmental effects of smog in Pakistan.
- Investigate and suggest ways to reduce the greenhouse effect.

Main Causes of Climate Change

Carbon dioxide is the main cause of human-induced climate change. It has been emitted in vast quantities from the burning of fossil fuels. It is a long-lived gas, which means it continues to affect the climate system during its long time presence in the atmosphere. Global warming and the greenhouse effect are other main causes of climate change in the world. Since the Industrial Revolution, human activities have released large amounts of carbon dioxide and other greenhouse gases into the atmosphere, which have changed the Earth's climate. Natural processes, such as changes in the Sun's energy and


Carbon dioxide (forestry and other land use) 11%
Methane 16%
Carbon dioxide (fossil fuel and other industrial processes) 65%
Nitrous Oxide 6%
F-gases 2%

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

volcanic eruptions, also affect the Earth's climate.

Scientists are analyzing a number of indirect measures of climate change, such as ice cores, tree rings, glacier lengths, pollen remains, and ocean sediments, and by studying changes in the Earth's orbit around the Sun. This record shows that the climate varies naturally over a wide range of time scales.

Activity:

- Analyze the effects of climatic change on flora and fauna.

Since the Industrial Revolution, we have been adding more and more greenhouse gases into the air, trapping even more heat. Instead of keeping the Earth at a warm and stable temperature, the greenhouse effect is heating the planet at a much faster rate. We call this the "Enhanced Greenhouse Effect" and it is the main cause of climate change.

Industrial Revolution

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Climate Change Related Events in the World

1. The most extreme heat wave in world history, such as June 2021 heat wave in western north America and in Karachi, (Pakistan) killed many people.
2. European summer floods: Major weather disaster in European history.
3. Flooding in Pakistan in 2010 CE and in 2022 CE are the disastrous impacts of climate change.
4. February 2020 CE cold wave in Central USA and in Pakistan killed many people in Murree.
5. July 2021: Earth's warmest month is recorded in history.
6. Pakistan is ranked sixth in the world in climate risk's index.

Activity:

- Make a plain/project about the main causes of climate change in the world and some particular areas.

Web Version of PCTB Textbook
Not for Sale

Ways We Can Go Green

Global Warming is a gradual increase in the overall temperature of the Earth's cause by increased levels of carbon dioxide, Chloro-Flouro-Carbon (CFCs) and other pollutants. Being green is a state of mind. It is about developing green habits particularly among children. It is need of hour to teach children about "green" means.

The 3R's of Being Green

Three R's are Reduce, Reuse, and Recycle.

Reduce

"Reduce" is about using fewer resources. If children are brushing their teeth, for instance, they do not have to leave the water running the entire time. They need to wet the brush before they

NOT FOR SALE (PESRP)

begin, to rinse their mouths and brushes when they are done.

Reuse

"Reuse" is about finding another, green use for an item one would normally consider ready for the trash can. Children may have eaten the contents of a tub of rice pudding, but can he do something with that plastic tub? May be they can use it to sprout seeds for transplanting into a backyard garden or perhaps it can be used for storing craft items, buttons, or to hold nails of a certain size.

Web Version of PCTB Textbook
Not for Sale

Recycle

"Recycle" is about ensuring that all waste is sorted and sent to a recycling plant, where it can be used to make something new. Instead of putting a plastic bottle into a wastebasket, children may store it alongside other empty plastic bottles to be recycled and make into some other item. In doing so children are learning how to reduce the amount of waste they produce and contributing to a greener way to reuse the materials .

Here is a list of some green ways you can teach your children to reduce, reuse, and recycle:

1. Children must turn off the lights whenever they leave a room.
2. Teach children to turn off the water tap when they are brushing their teeth.
3. When the weather is nice, suggest that children walk or ride their bicycles to where they are

NOT FOR SALE (PESRP)

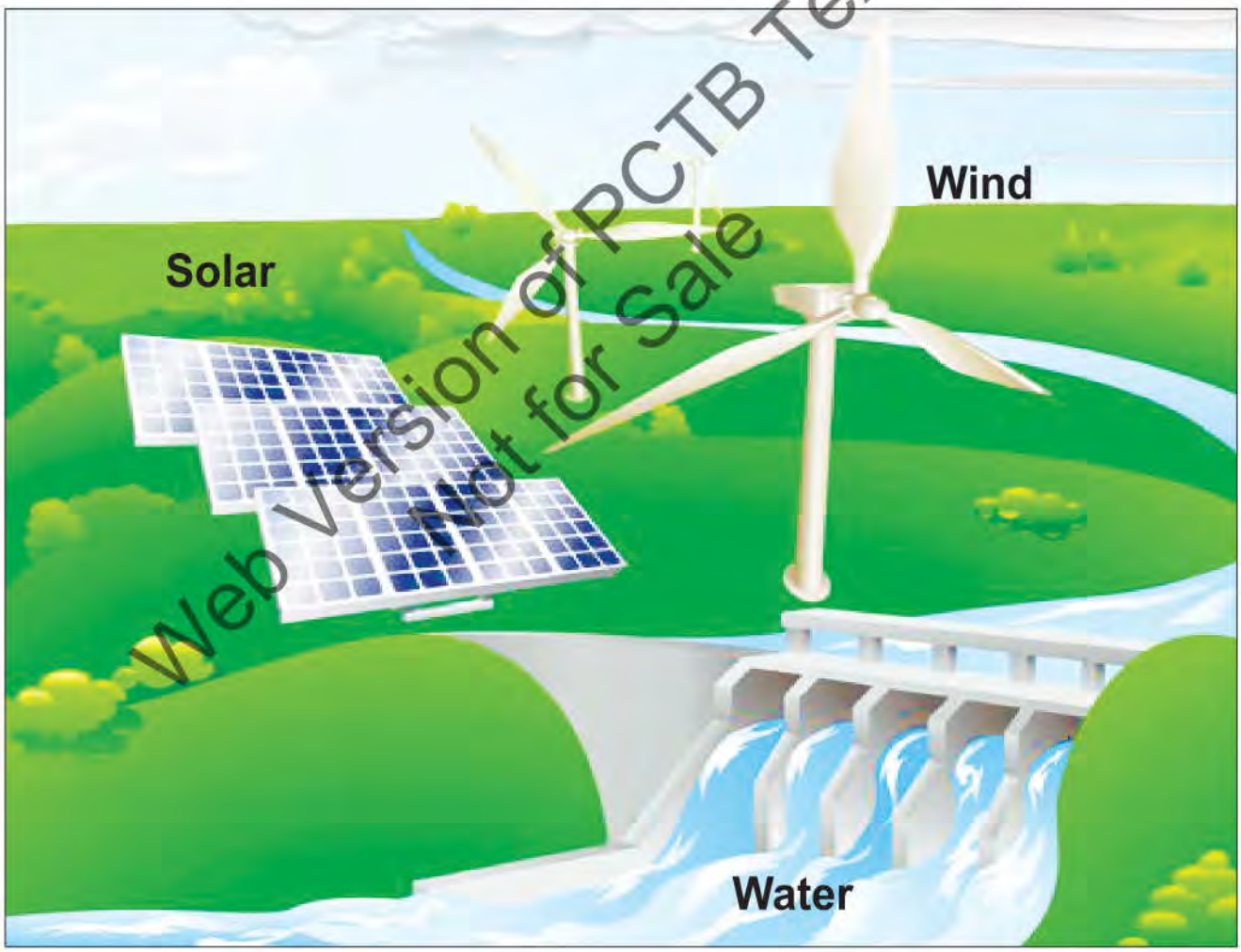
going instead of going by car or bus.

4. Teach children to unplug computers and appliances when not in use.
5. Together, make a compost bin and use it!
6. Teach children to always think before throwing things away: Can I use this again?
7. Have your children put out a bucket to catch rainwater? Use it to water plants.

Renewable Energy Sources

Most alternative energy sources are renewable, which means that different fossil fuels, are not likely to run out. Examples of renewable energy sources include the Sun, wind, rivers, oceans, heat from inside the Earth (geothermal energy) and bio fuels. These energy sources can be used to generate electricity and as fuel for vehicles, etc.

Web Version of PCTB Textbook
Not for Sale



Renewable Energy Sources

NOT FOR SALE (PESRP)

Information Facts:

- Humans are increasingly influencing the climate and the Earth's temperature by burning fossil fuels, cutting down forests and farming livestock.

What We Have Learnt!

1. Weather is the whole condition of temperature, atmospheric pressure, wind speed, air humidity and precipitation (rain and snow) of a particular place at a particular time.
2. Carbon dioxide (CO_2) and other gases absorb the heat coming from the Earth.
3. Since the Industrial Revolution, we have been adding more and more greenhouse gases into the air, trapping even more heat.
4. The atmosphere of the Earth changes due to the activities of human beings.
5. Ozone (O_3) is produced and destroyed naturally.
6. The greenhouse effect is the way in which heat is trapped close to the Earth's surface by "Greenhouse Gases."
7. In 2009 CE, an International Conference was held in Copenhagen (capital of Denmark) on the issue of climate changes. Many countries of the world participated in this conference.
8. The level of carbon dioxide in the Earth's atmosphere is gradually rising.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

EXERCISE

Q.1: Tick (✓) the correct answer.

i. The gas responsible for rise in the Earth's temperature:

(a) sulphur dioxide (b) hydrogen

(c) nitric oxide (d) carbon dioxide

ii. Hydro chloro fluoro carbons (HCFCs) is a:

(a) gas (b) liquid

(c) sold (d) power plant

iii. Example of green house gas:

(a) helium (b) hydrogen

(c) carbon dioxide (d) nitrogen

iv. Earth's warmest month was recorded in:

(a) July 2019 (b) July 2020

(b) July 2021 (d) July 2022

v. In 2009, an International Conference about global climate change was held in:

(a) Seoul (b) London

(c) Tokyo (d) Copenhagen

Web Version of PCTB Textbook Not for Sale

Q. 2: Give short answers of the following:

i. Differentiate between climate and weather.

ii. What is Global Warming?

iii. Which gas absorbs the heat coming from the Earth?

iv. Write a few benefits of Ozone gas.

v. Define the term greenhouse effect.

Q. 3: Write the answer of the following in detail:

i. Analyze the effect of climatic change on the Earth.

ii. Descrobe some climatic change related events in the world.

NOT FOR SALE (PESRP)

iii. What changes may be caused by the greenhouse effect? Describe.

iv. Do you know that Ozone layer is very important? Explain.

v. Write a note on 3R's.

Learning Activities:

The Teacher will:

i. Use pictures, videos, etc. to explain the consequences of climatic change.

ii. Use web links of weather channels, videos, and reading material, involve students and launch a campaign 'Save the Earth'! From Warming.

iii. Implement 3Rs with activities

- Promoting green purchasing.
- Internal reuse of furniture and stationery.

Critical Thinking Questions:

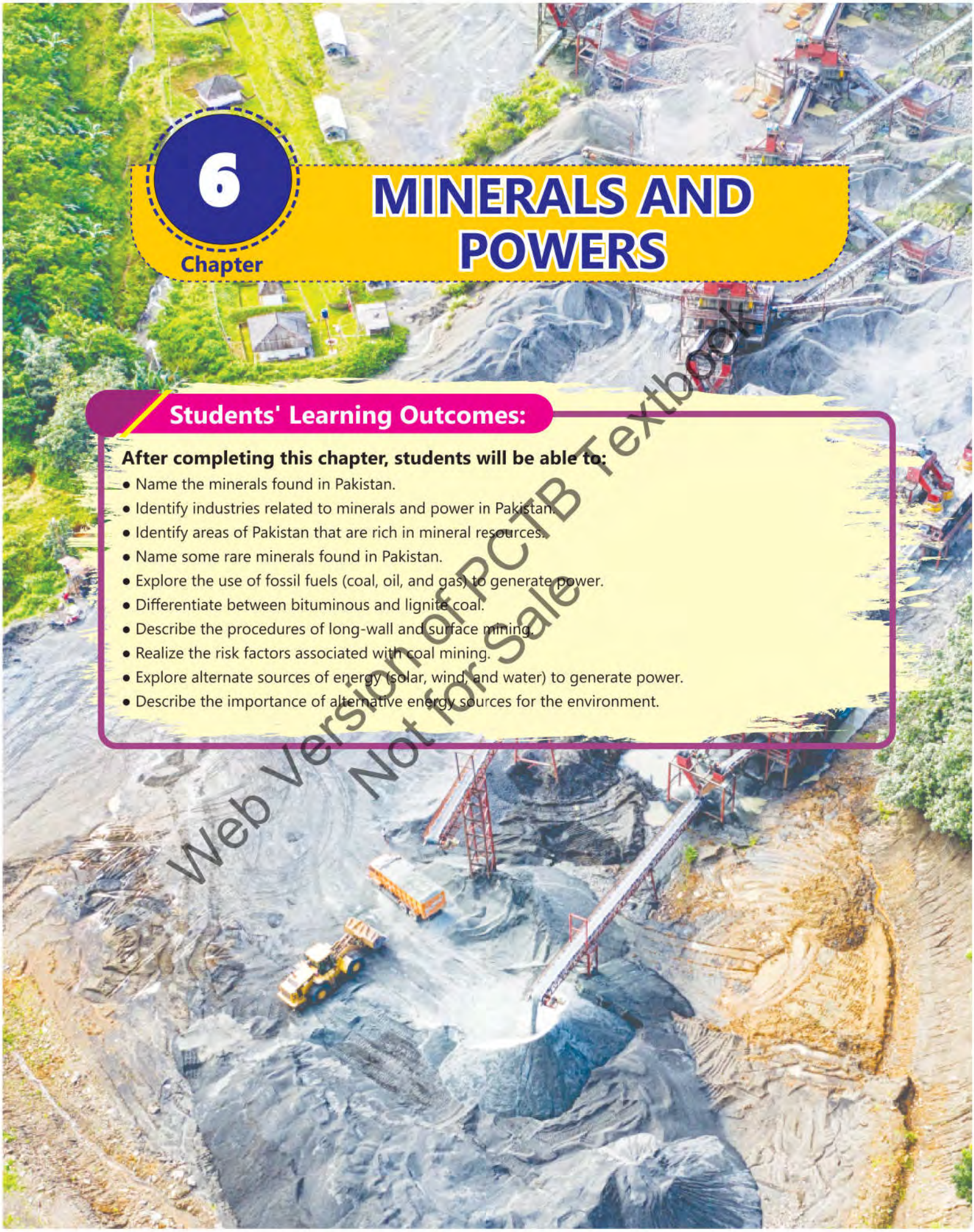
- Suggest some ways to reduce plastic use in daily life?
- Why do we care about Ozone depletion?
- What can we do to stop green house effect?
- How can we use the renewable energy?

Projects For Students:

- Project 3Rs is all about "Reuse, Reduce and Recycle". It is to create awareness among children, parents and the community about the importance of reuse, reduce and recycle.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)



Chapter 6

MINERALS AND POWERS

Students' Learning Outcomes:

After completing this chapter, students will be able to:

- Name the minerals found in Pakistan.
- Identify industries related to minerals and power in Pakistan.
- Identify areas of Pakistan that are rich in mineral resources.
- Name some rare minerals found in Pakistan.
- Explore the use of fossil fuels (coal, oil, and gas) to generate power.
- Differentiate between bituminous and lignite coal.
- Describe the procedures of long-wall and surface mining.
- Realize the risk factors associated with coal mining.
- Explore alternate sources of energy (solar, wind, and water) to generate power.
- Describe the importance of alternative energy sources for the environment.

Web Version of PCTB Textbook
Not for Sale

Mineral

Minerals are an important part of our everyday life. They make up the most of the Earth. They are defined as naturally occurring substances that have a crystalline structure. A mineral is an element or chemical compound that is normally crystalline and that has been formed as a result of geological processes. When two or more elements combine together they form a mineral. For examples, salt, iron and sulphur, etc. or minerals.

To get an access to minerals treasure and mining industry, it is necessary to get the services of mining experts. Miners should be well-trained and best means of transport should be available to send these minerals to industries. Moreover, modern machinery is also important. Thorough digging of mines and adequate financial resources for the extraction of minerals is utmost important so that work may continue without any interruption. New industries should be installed to use these minerals as raw material.

Do You Know?

Extraction of valuable minerals and other material from the Earth is called mining.

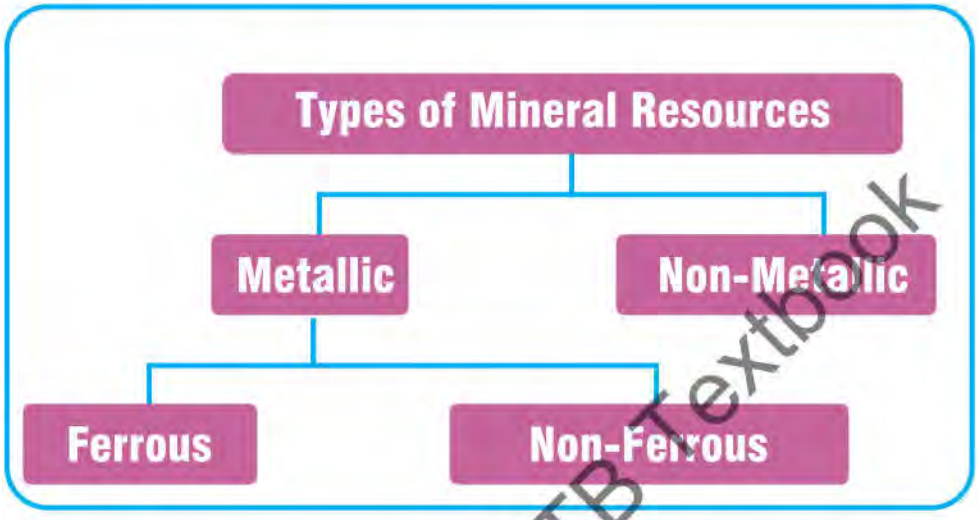
Web Version of PCTB Textbook
Not for Sale

Different types of Minerals

NOT FOR SALE (PESRP)

Different Types of Minerals

Minerals are classified, on their crystal form and chemistry. They are divided into two types namely, metallic and non-metallic.



1. Metallic Minerals

Metallic minerals exhibit lustre or shine in their appearance and consist of metals in their chemical composition. These minerals serve as a potential source of metal and can be extracted through mining. Examples of metallic minerals are manganese, iron ore and bauxite. They are divided into ferrous and non-ferrous metallic minerals. Ferrous minerals are those which contain iron and non-ferrous are those which does not contain iron.

2. Non-Metallic Minerals

Non-metallic minerals are minerals which either show a non-metallic lustre or shine in their appearance. Extractable metals are not present in their chemical composition. Limestone and gypsum are examples of non-metallic minerals.

Web Version of PCTB Textbook
Not for Sale

Minerals Found in Pakistan

1. Mineral Oil

Mineral oil and its products have economic importance. Major products of mineral oil include gasoline, kerosene oil, wax, coal tar, etc. In 1961 CE after the establishment of Oil and Gas Development Corporation Limited (OGDCL) in Pakistan, oil exploration process started. Potwar Plateau in Pakistan

Extraction of Mineral Oil

NOT FOR SALE (PESRP)

has a rich background for the production of mineral oil where oil wells are located in Balksar, Khor, Dhullian, Joyamir, Minwal, Tut, Kot Sarang, and Mial. In lower Sindh, important areas for oil production are Khaskheli, Tando Allahyar and Zamzama. These reserves are playing an important role in catering domestic oil demand. Mineral oil is used after refining.

2. Natural Gas

Natural Gas is a cheap source of energy. In Pakistan, natural gas was discovered at Sui in Sibbi, Balochistan in 1952 CE. That is why in Pakistan it is commonly called as Sui Gas. These reserves of natural gas are among the biggest reserves of the world. This gas is used for commercial as well as for domestic purposes. Gas has been discovered in Uch and Zan in Balochistan, Khairpur, Mazrani, Sari, Hundi, Kandkot and Sarang in Sindh. Reserves of natural gas in Dhodak, Pirkoh, Dhullian are in Punjab.

Natural Gas

3. Copper

In ancient times, copper was used only for coins, utensils, etc. Now it is being used for electric cables in Pakistan. In Balochistan, reserves of copper are discovered and found in Chaghi, Sandak, Qalat, Zhob and some other places. In Khyber Pakhtunkhwa, copper reserves are in Dir, Chitral and Hazara.

4. Coal

In Pakistan coal is used for thermal power production, brick kilns and for domestic purposes. At present, coal mining areas are Dandot, Paddh and Makarwal. In Sindh, coal mines are located in Thar, Jamper, Sarang and Lakhra. In Khyber Pakhtunkhwa, coal reserves are in Hangu. Coal is one of most important source of energy. These reserves are playing an important role in catering domestic coal demand.

Coal

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Difference Between Bituminous and Lignite Coal

Difference between lignite and bituminous coal can be analyzed during combustion. Lignite is easier to ignite while bituminous coal is easier to burn out.

Bituminous coal contains 77-87 % carbon, whereas anthracite coal contains more than 87% carbon. Bituminous coal can be converted to anthracite with time. This process is known as anthracitization. Bituminous coal is a sedimentary rock, whereas anthracite is a metamorphic rock.

5. Iron Ore

Production of iron ore in Pakistan was started in 1957 CE. Explored reserves of iron are approximately more than 450 million tons. Major iron ore reserve sites in Pakistan include Kalabagh (district Mianwali), Domal Nisar (district Chitral), Langrial and Chilghazi (district Chaghi).

6. Rock Salt

Rock Salt is used in chemical industry as well as in cooking. Extensive reserves of salt in Pakistan are in Khewra, district Jhelum. Other reserves are in Kalabagh (district Mianwali), Warcha (district Khushab) and Bahadurkhail (district Karak). Salt is also mined from Lasbela, Makran (near coast in Balochistan) and Maripur (Karachi).

Rock Salt

7. Chromite

There are more than 25 big reserves of chromite in Pakistan. It is exported to different countries and also used in Karachi Steel Mill. Chromite reserves in Balochistan, have been found in Muslim Bagh, Chaghi and Kharan areas. Some reserves were also found in Malakand and Mohmand Agency areas of Khyber Pakhtunkhwa. Chromite is an important metal which is mainly used in steel industry.

Web Version of PCTB Textbook
Not for Sale

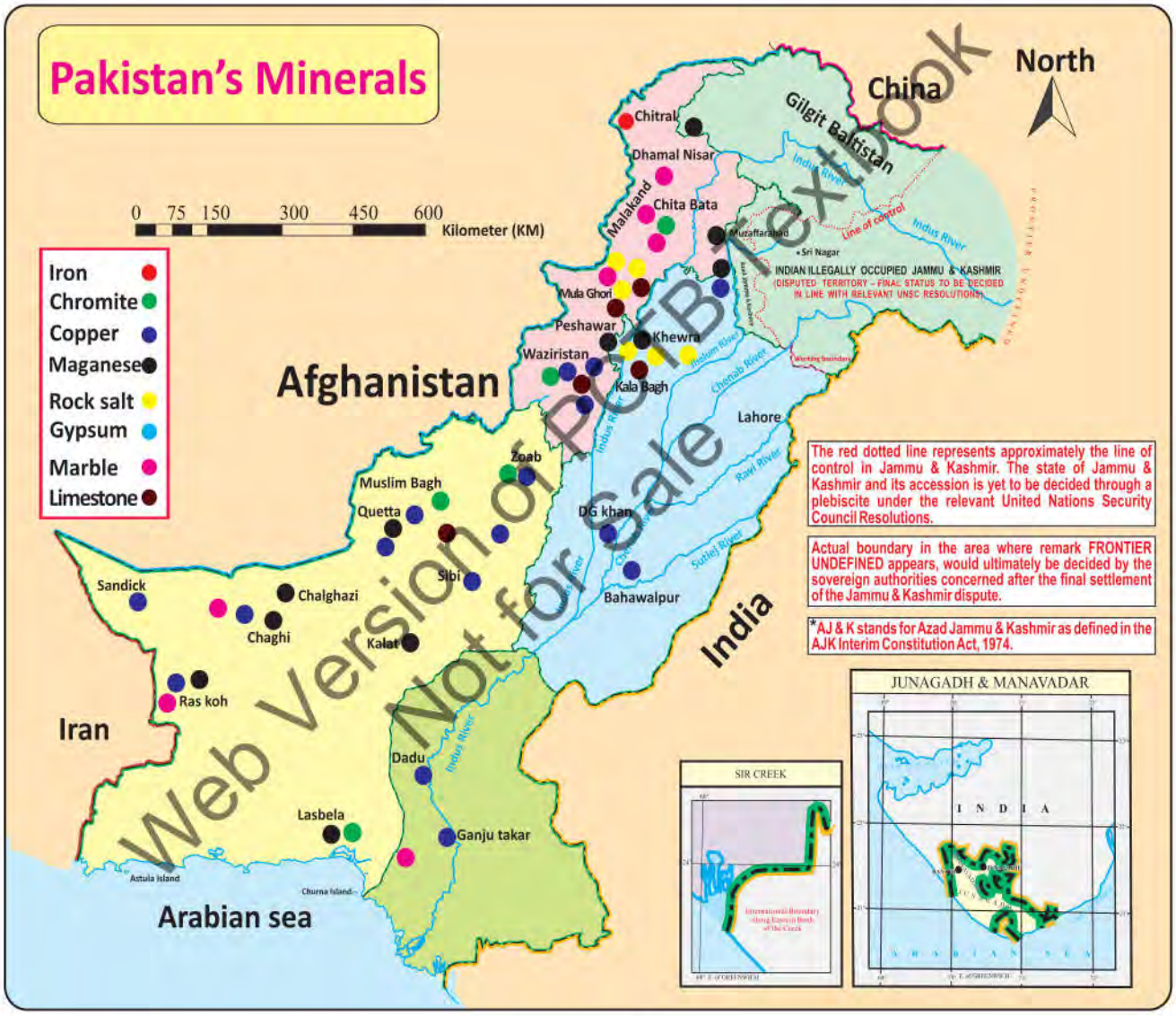
Facts about Khewra Salt Mine

Khewra Salt Mines is the second largest salt mine in the world. This mine is located in Tehsil Pind Dadan Khan of district Jhelum,which is located in the province of Punjab.

NOT FOR SALE (PESRP)

8. Gypsum

Gypsum is used as raw material in phosphate fertilizer. It is also important for cement, paper, plaster of paris, sulphuric acid, paints and rubber industries. Most of gypsum in Pakistan is found in salt range areas of Khewra, Dandot, Daudkhel and Qadirabad. There are also some mines of gypsum in Rohri, Kohat, Dera Ghazi Khan, Lora Lai and Sibbi. Pakistan is endowed with vast reserves of gypsum which are more than 350 million tons (approximatly).



Web Version of PCTB Text Book
Not for Sale

Note For Teacher:

- Use pictures, magazines, books, and videos, etc. to explain the importance of minerals in Pakistan.

NOT FOR SALE (PESRP)

9. Marble

Marble of different types and colours is found in Pakistan. It is used for the surfacing of floors and walls of buildings. Marble producing areas include Mardan, Swat, Nowshera,

Marble

Hazara, Chaghi, Gilgit and district Muzaffarabad (Azad Kashmir). Moreover, black and white marble in great quantity has been discovered in Kala Chitta range of Attock.

Web Version of PCTB Textbook
Not for Sale

10. Lime Stone

Limestone is an extremely useful mineral. It is used in glass, soap, steel, bleaching powder industries for whitewash, paints, lime and soda ash. Most of limestone in Pakistan is found in northern and western hilly areas. Its reserves are in Daudkhel, Wah, Rohri, Hyderabad, Sibbi, Dera Ghazi Khan, Kohat, Nowshera and Khuzdar.

Industries Related to Minerals and Power in Pakistan

Minerals Related Industries

i. Minerals Related Industries

In present industrial age, minerals have an essential role in the industrial and economic development of a country. They are important for economic development of Pakistan. Minerals are used in following industries as raw material:

NOT FOR SALE (PESRP)

- Iron and steel industry
- Aluminium industry
- Cement industry
- Copper smelting industry
- Lead and zinc smelting industry

Minerals	Unit of Quantity	2018-19	2019-20	2020-21	July-March	
					2020-21	2021-22*
Coal	000 M.T	5,407	8,428	9,230	6,798	7,365
Natural Gas	000 M.CU.Mtr	40.68	37.29	36.22	27.25	28.2
Crude Oil	M.Barrels	32.50	28.09	27.56	20.77	21.70
Chromite	000 M.T	138	121	134	101	127
Magnesite	000 M.T	43	16	15	13	6
Dolomite	000 M.T	472	302	388	335	325
Gypsum	000 M.T	2,518	2,150	2527	955	1,232
Lime Stone	000 M.T	75,596	65,810	76,632	59,366	39,581
Rock Salt	000 M.T	3,799	3,369	3,366	2,686	2,037
Sulphur	000 M.T	21	20	19	15	12
Barytes	000 M.T	116	55	52	32	84
Iron Ore	000 M.T	627	574	806	611	620
Soap Stone	000 M.T	157	150	289	241	259
Marble	000 M.T	7,736	5,797	7917	6,204	4,781
Ocher	000 M.T	81	132	107	87	65

*: Provisional Source: Pakistan Bureau of Statistics (PBS)

Web Version of PCTB Textbook
Not for Sale

i. Power Related Industries

The energy industry is involved in the production and sale of energy, including fuel extraction, manufacturing, refining and distribution. Modern society consumes large amounts of fuel, and the energy industry is a crucial part of the infrastructure and maintenance of society in Pakistan. In particular, the energy industry comprises the fossil fuel industries, which include petroleum industries (oil companies, petroleum refiners, fuel transport and end-user sales at Petrol pumps), coal industries (extraction and processing) and the natural gas industries (natural gas extraction, and coal gas manufacture, as well as distribution and sales).

- The electrical power industry, including electricity generation, electric power distribution and sales.
- The renewable energy industry, comprising alternative energy and sustainable energy companies, including those involved in hydroelectric power, wind power, and solar power generation, and the manufacture, distribution and sale of alternative fuels.
- Traditional energy industry based on the collection and distribution of firewood, the use of

NOT FOR SALE (PESRP)

which, for cooking and heating, is particularly common in less developed countries.

Areas of Pakistan that are Rich in Mineral Resources

Pakistan also possesses (Mines) a variety of precious and semi-precious minerals including ruby, topaz and emerald. The most potential and valuable minerals of Pakistan includes; Marble, Granite, Coal, Chromite, Gypsum, Copper, Gold, Iron Ore, Lead, Zinc, Bauxite, Crude Oil and Natural Gas.

The Reko Diq mine is a planned mining operation, located near Reko Diq town in Chagai district, Balochistan, Pakistan. Reko Diq represents one of the largest copper and gold reserves in the world. Tharparkar district of Sindh, Potwar in Punjab, Shahrag in Balochistan, Mianwali, Dera Ghazi Khan, Kohat, Rohri, Quetta and Sibi, etc. are famous for rich minerals in Pakistan.

Some Rare Minerals Found in Pakistan

Salt has been mined in the region since 320 BC. The Khewra Salt Mines are among the world's oldest and 2nd largest salt mines. Salt is mined at Khewra in an underground area of about 110 square kilometres (42 sq mi). Khewra salt mine has an estimated total of 220 million ton of rock salt deposits. In Reko Diq (Balochistan), deposits of copper and gold are present. A number of precious stones are mined and polished for local as well as export purposes.

Rare Minerals

Web Version of PCTB Textbook
Not for Sale

Skills

- Locate areas of Pakistan that are rich in mineral resources on maps.
- Categorize the minerals found in Pakistan according to their use and importance.
- Analyze factors that make gemstone mining difficult in Pakistan.
- Analyze the reasons that hamper the yield of gemstone mining in Pakistan.
- Suggest practical ways of getting high-income revenue from Pakistan's gemstones resources.
- Investigate and suggest measures for improving the mining industry.
- Suggest measures to ensure the safety and health of the coal miners in Pakistan.

NOT FOR SALE (PESRP)

Use of Fossil Fuels (coal, Oil, and Gas) to Generate Power

In Pakistan, thermal power plants are running with gas, oil and coal. Thermal power production units are operational in Karachi, Lahore, Multan, Faisalabad, Guddu, Jam Shoro, Muzaffargarh, Sukkhur, Larkana, Kotri, Pasni, Gilgit and Kot Addu. To cater the future needs of electric power in Pakistan many projects are in place and other are in progress.

Types of Mining

Some types of mining are described below:

1. Hand-Panning Mining

Some time precious metal deposits like gold, etc. are found in alluvial deposits. When deposits are dried up, they are collected in a pan. Then the grains of gold are separated from sand.

Hand-Panning Mining

2. Shaft Tunnel Mining

It is a method of extracting minerals from great depth. According to this method, a shaft is used to drill vertically, after which mining process is started.

3. Open-Pit Mining

This method is used for minerals which are found near the surface. In this method, overburden is removed little by little. In Pakistan, open-pit mining method is adopted for the extraction of copper, chromite and limestone, etc.

Open-Pit Mining

4. Adit Tunnel Mining

In this method, horizontal passages or tunnels are dug between slopes in hilly areas. Minerals slide down from slopes and gather in tunnels or ditches. Then digging is done in these ditches to extract the minerals. Adit tunnel mining is especially useful in the mining of salt and coal.

5. Drill Mining

This is a method of extracting the minerals from deeper layers by drilling a hole. Pipes are fitted in this hole. Then minerals are brought on surface through pipes. This method is in use for oil and gas.

Drill Mining

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Risk Factors Associated with Coal Mining

There are significant environmental impacts associated with coal mining and use. It could require the removal of massive amounts of top soil, leading to erosion, loss of habitat and pollution. Coal mining causes acid mine drainage, which causes heavy metals to dissolve and seep into ground and surface water. Some risks are:

- Coal dust is one of the most common concerns for miners.
- Noise
- Whole body vibration
- Exposure
- Thermal stress
- Chemical hazards

Alternate Sources of Energy to Generate Power

(i) Solar Power

Energy obtained from sunlight is called solar power which is being used for electric power generation. At present, solar power is being utilized in Pakistan on a very small scale, for example, running small machinery, few houses and motors. Soon the solar energy will be the main source of energy all over the world because other sources of energy are expensive and hard to access. Quaid-e-Azam Solar Power Park has been installed in Bahawalpur district of Punjab, to get cheaper energy.

Solar Power

(ii) Wind Energy

Use of winds for energy generation is called wind-electric power. In Pakistan, plans are being implemented to generate electric power with the help of wind. Windmill consists of three or four blade fans fixed on high poles. These fans are called turbines. Wind moves these fans and their energy is converted to electric power. Jhimpir Wind Power Plant is installed in Thatta, Sindh province.

Wind Energy

(iii) Hydro Energy

Northern and north-western hilly regions of Pakistan are very important for hydro electricity where natural environment is suitable for dams. In plains waters of rivers and canals are used to produce hydro power. Tarbela Dam on River Indus is the largest hydro-electric power project,

Hydro Energy

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

whereas Ghazi Barotha (indus River) and Mangala dam on River Jhelum are the main hydropower projects. Warsak Dam is constructed on River Kabul. Chashma hydro-electric plant, Malakand, Dargai hydropower project and Rasul hydropower plant, etc. are other important hydro electricity projects. This is the cheapest electricity generating source.

Hydropower

Web Version of PCTB Textbook
Not for Sale

Importance of Alternative Energy Sources for the Environment

Environmental and economic benefits of using renewable energy sources are as under:

1. A fuel supply that never runs out
2. Zero carbon emissions
3. Clean air and water
4. A cheaper form of electricity
5. Renewable energy creates new jobs
6. No greenhouse gases emissions
7. No pollution
8. Reversing climate change

NOT FOR SALE (PESRP)

Skills

- Draw and label the procedures of long-wall and surface mining.
- Analyze coal usage in Pakistan.
- Evaluate the usefulness of coal against the risk factors associated with it.
- Identify the importance of alternate sources of energy.
- Explore reasons for the scarcity of electricity and gas in Pakistan in recent years.

What We Have Learnt!

1. In Pakistan, coal is used for thermal power production, brick kilns and domestic needs.
2. In Pakistan, natural gas was discovered at Sui in Sibbi, Balochistan.
3. There are more than 25 vast reserves of chromite in Pakistan.
4. Extraction of valuable minerals and other materials from the earth is called mining.
5. Major products of mineral oil include gasoline, kerosene oil, wax, coal tar, etc.
6. Production of iron ore in Pakistan was started in 1957 CE.
7. Gypsum is used as raw material in phosphate fertilizer.
8. Energy extracted from sunlight is called solar power.

Web Version of PCTB Textbook
Not for Sale

EXERCISE

Q.1: Tick (✓) the correct answer.

i. Reserves of mineral in Pakistan are approximately more than 220 million tons:

(a) Coal (b) Salt

(c) Gypsum (d) Iron

NOT FOR SALE (PESRP)

ii. Extraction of valuable minerals and other material from the Earth is called:

(a) Mining (b) Geography

(c) Geology (d) Geodesy

iii. In Pakistan, natural gas was discovered in:

(a) Sindh (b) Punjab

(c) Khyber Pakhtunkhwa (d) Balochistan

iv. Production of iron ore in Pakistan was started in:

(a) 1953 CE (b) 1955 CE

(c) 1957 CE (d) 1959 CE

v. Energy obtained from sunlight is called:

(a) Wolar power (b) Solar power

(c) Hydro power (d) Nuclear power

Q. 2: Give short answers of the following:

i. What is the difference between metallic and non-metallic minerals?

ii. What are the uses of Coal?

iii. How wind-electricity is generated?

iv. Define minerals and give examples.

v. What are the major products of mineral oil?

Q. 3: Write the answer of the following in detail:

i. Describe the minerals found in Pakistan.

ii. Explain industries related to minerals and power in Pakistan.

iii. Discuss the use of fossil fuels (coal, oil, and gas) to generate power.

iv. Describe the types of mining.

v. Analyze the risk factors associated with coal mining.

vi. Explain alternate sources of energy (solar, wind, and water) to generate power.

vii. Highlight the importance of alternative energy sources for the environment.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Learning Activities:

The Teacher will:

i. Use presentations, diagrams, and videos to explain the procedures of long-wall and surface mining.

ii. Collect information about the Khewra Salt Mines. Make a chart and display it in the classroom.

Critical Thinking Questions:

- Explore some common challenges faced by the mining industry.
- Explore the impacts of mining on the environment.
- Why solar energy is important for future?
- What are pros and cones of wind energy?

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Project for Students:

- Make a model of a mine by showing the process of Mining.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Glossary

Grassland	Grassland is a region where grass is the main type of vegetation.
Erosional Plains	These plains are formed in millions of years due to action of various agents like river, glacier and wind.
Natural Levees	Levees are formed by the repeated flooding of the river. When the river flooded, the most coarse material deposits, close to the river banks. This may continue to build up the levees over time.
Springs	Springs are natural freshwater sources found on the Earth's surface. They get their water from underground streams or aquifers.
Precipitation	During condensation the water droplets join together and start falling on the earth surface, it is called precipitation. Rainfall is most common form of precipitation.
Sublimation	Sublimation is a process where ice directly converts into water vapours without converting into liquid water or vapours directly converts into ice without converting into liquid.
Biogas	Biogas is a renewable fuel produced by the breakdown of organic matter such as food scraps and animal waste.
Distillation	Distillation is a water purification method that utilizes heat to collect pure water in the form of vapours.

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)

Glossary

Agriculture	The science, art, and business of cultivating soil, producing crops, and raising livestock; farming.
Mixed Farming	Method of farming in which crop production is combined with the rearing of livestock.
Condensation	The process by which a gas or vapor changes to a liquid.
Exports	To send or transport a commodity, abroad, especially for trade or sale.
Imports	To bring or carry in from an outside source, especially to bring in (goods or materials) from a foreign country for trade or sale.
Karez	A method of irrigation in which groundwater is tapped by a tunnel. After running for some distance the tunnel comes out in the open and the water is conducted to the command area.
Metallic minerals	Those minerals which can be melted to obtain new products, for example iron, cooper, bauxite, tin, manganese.
Non-metallic	Non-metallic minerals are those which do not yield new products on melting, for example coal, salt, clay, marble.
Mining	Extraction of solid mineral resources from the Earth.
Rain Gauge	An instrument to gather and measure the amount of liquid precipitation over a set period of time.
Means of Irrigation	To supply (dry land) with water by means of canals, ditches, pipes, or streams.
Snowfall	The rate at which snow fall; this is usually expressed as inches of snow depth per 6-hour period.

Web Version of PCTB Textbook
Not for Sale

Bibliography

- Physical Geography By Jeremy Patrich California based geographer
- Physical geography: fundamentals of the physical environment By Christopherson, R.W. Geosystems.
- Fundamentals of Physical Geography by by James Petersen & Robert E. Gablers.
- Introduction to Human Geography BY Steven Graves.
- Urban Social Geography By Paul Knox and Steven Pinch.
- Geography Textbooks for Grade-6,7,8 ,PCTB (old).
- The Environment of Pakistan By Huma Naz Sethi.
- Physical Geography By Strahler
- Physical Geography By Deblij
- Survey of Pakistan
- Economic Survey of Pakistan

Web Version of PCTB Textbook
Not for Sale

NOT FOR SALE (PESRP)